Editor CHARLES O. HERB

Associate Editors FREEMAN C. DUSTON CHARLES H. WICK EDGAR ALTHOLZ

Book Editor HOLBROOK L. HORTON

Published Monthly By THE INDUSTRIAL PRESS Lafeyette St., New York 13, N. Y.

ROBERT B. LUCHARS President

EDGAR A. BECKER Vice-President and Treasurer

HAROLD L. GRAY cretary and Publishing Manager

e

Advertising Representatives WALTER E. ROBINSON DWIGHT COOK Lafayette St., New York 13, N. Y.

GEORGE H. BUEHLER 228 N. LaSal's St., Chicago 1, III.

HORMAN O. WYNKOOP, Jr. 17597 James Couzens Highway Detroit 35, Mich.

DON HARWAY & COMPANY W. Eighth St., Los Angeles 17, Calif.

oscription Rates: United States and made, one year, \$4; two years, \$7; we years, \$8; foreign countries, one years, \$13. Single copies, cents. Changes in address must received by the fifteenth of the with to be effective for the next we. Send old as well as new address. Original 1952 by The Industrial Press. Level as second-class mail matter, prember, 1894, at the Post Office, w York, N. Y., under the Act of mith 3, 1879. Printed in the United ses of America.

British Address: National House, West St. Brighton 1, England

Total Distribution for July, 25,025





CHINERY

VOLUME 58

AUGUST, 1952

NUMBER 12

The Monthly Magazine of Engineering and Production in the Manufacture of Metal Products

SHOP PRACTICE

Barrel Finishing Precision Turbo-Jet Parts By Dudley J. Kaharl 14	45
Instruments Require Precision of Mind, Hand and Machine	
By Edgar Altholz 1	56
Dynamic Balancing of Crankshafts Accomplished Automatically	
By Charles H. Wick 10	61
High-Speed Trepanning with Carbide-Tipped Tools 10	65
Making Large Plain Sleeve Bearings to Close Tolerances	
By E. C. Phelps 1'	74
Mollerizing Iron and Steel Provides Aluminum Surfaces 1'	79
Shell Mold Casting of Stainless Steel 12	84
Common Centerless Through-Feed Grinding Troubles and How to Correct Them (Data Sheet)	47

ACHINE AND TOOL DESIGN	
How to Produce High-Quality Aluminum Die-Castings	
By Henry H. Ryffel	152
Swaged Bearing Retention for Moderate to High Thrust Loads By Gilbert C. Close	188
Oscillating Mechanism Produces Groove of Uniform Depth in	
Concave Surface	193
Toggle-Action Drill Jig that Clamps Work at Four Points	
By Rudolph Sachtleber	195
Self-Equalizing Quick-Acting Milling Fixture	
By B. P. Fortin, Sr.	199
Fixture Jaws Combine Downward Pull with Closing Action	
By W. M. Halliday	
Drill Jig Utilizing V-Block Principle By J. C. Kaiser	201
Piercing Die Automatically Loads and Ejects Work	
By Federico Strasser	201
Radii on Edges of Drawing Dies By J. McDonald	202

MANAGEMENT PROBLEMS

1975 and Now By	oring F. Overman 141
Off Again, On Again in Government Buying	y Charles O. Herb 143
The Sales Engineer and His Problems-Why Is	He Glad to Listen?
4.	By Bernard Lester 203

DEPARTMENTS

		17161119	
Keeping up with Washington	141		199
Materials of Industry	172	The Sales Engineer	203
In Shops Around the Country	182	The Latest in Shop Equipment	204
	193	New Catalogues	237
Engineering News	196	Between Grinds	241
Questions and Answers	198		242
Data Sheet	200	247	

Product Directory



Advertisers Index 395-396

Landmaco Machine Threads Bell-shaped Gas Cylinder Collars

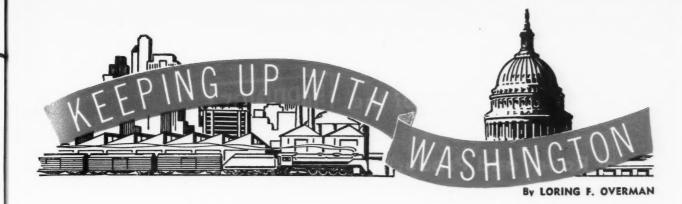
HARRISBURG Steel Corporation was interested in securing a more productive and economical means for threading stamped steel gas cylinder collars. Their threading problem arose mainly from the unusual bell shape of the work piece (Fig. #1), which made chucking difficult.

To solve their problem a 1½" LANDMACO Threading Machine was furnished equipped with a special work holding fixture. The fixture (Fig. #2) is bolted to both vise jaws and thus render-

results of a solid carriage front. The gas cylinder collars are slipped over the arbor of the fixture and abutted against the circular abutting plate. Three semi-round drive keys, which fit into pressed key ways in the bore of the work piece, prevent it from rotating on the arbor while under cut.

The die head supplied with this machine was a 11/4" Lanco Internal Trip Heat Treated Head.

(Fig: #3) Special Oversize chaser holders were provided for cutting a 31/8" diameter, 11 pitch, U.N. form thread



1975 and Now

RECENT weeks have seen Washington tied in knots over extension of the Defense Production Act, the steel strike, continuation of wage and price controls, Congressional adjournment plans, last-minute appropriation bills—and politics. Indeed, it is hard to see just where politics end and other Washington capers begin. Suffice to say that Washington continues to plan big things for machines, and for the men who design and make them.

Come 1975

sired

nder

ture

late.

into

iece,

un-

as a

ead.

rsize

ided

eter,

read

Amid the short-range pattern of pre-election hysteria, it is startling to find some folks thinking in terms of 1975 and beyond. Consider, for example, the five-volume report of the President's Materials Policy Committee, released in part after nearly a year and a half of study. The report seeks to answer five questions: the long-range requirements outlook, the long-range supply outlook, the prospect for and extent of probable shortages, the consistency and adequacy of existing Government programs, and the consistency and adequacy of private industry practices.

Only the first two of five projected volumes are complete, but the conclusions therein are of concern to anyone whose activities involve the availability and utilization of power, fuel, and raw materials. For example, the machinery man planning for 1975 must anticipate a 90 per cent increase in the demand for minerals, according to the report. He must also expect a 260 per cent increase in the demand for electrical energy, as well as substantial increases in forest products, agricultural resources, and water.

The Commission points out the need for a world policy with reference to supplies of materials. The reason for emphasis on a "world policy" is that "the United States is outgrowing its present usable domestic resources base." To support that premise, the Commission observes:

Of approximately seventy-four ma-

terials now stockpiled by the Munitions Board, we import all of our supplies in more than forty categories, and import part of the remaining materials.

Of more than one-hundred minerals now used by industry, about one-third is fully supplied at home, another one-third comes partly from home and partly from abroad, and the final third entirely from overseas. Even in the case of iron and petroleum, we import sizable and growing amounts. And, instead of being one of the world's largest exporters of copper, lead, and zinc, we are now huge importers.

The Commission points out somethings highly significant: "Absolute shortages are not the threat in the materials problem. The central challenge is to meet our expanding demands with expanding supplies while averting a rise in real costs per unit."

Wanted, 35,000 Machine Tools

Of more immediate concern to machine tool builders was a recent estimate that 35,000 additional machines worth approximately half a billion dollars will be ordered by the end of 1953 by the Air Force and the Navy's Bureau of Ships and Bureau of Ordnance. The Army is still reviewing its own requirements.

The estimate of a 35,000 order book for 1953 came out at a meeting of the Machine Tool Manufacturers' Industry Advisory Committee. At the same meeting, members of the IAC agreed to a proposed amendment to NPA Order M-41, to permit completion and shipment on unrated orders if such business does not delay rated orders. Under regulations requiring the filing of a rating with each order, producers of wanted types of military equipment have been overloaded, while other industry members have reported unused capacity.

Contributing to the uncertainty which the amendment seeks to correct is the fact that it has been most difficult to gather reliable information on military requirements for

machine tools. In addition to fluctuating schedules, the industry has reported an alarming number of military cancellations.

Central Machine Tool Inventory

In another of many efforts to find out what machine tools are needed, what kinds are on hand, and where they are located, NPA has announced the establishment of a Central Inventory Group within the Metalworking Division of the National Production Authority. Some 28,000 machine tools have already been listed as owned but unused by the Armed Services, Maritime Administration, General Services Administration. Desense Materials Procurement Agency, Atomic Energy Commission, and the Federal Security Agency, or held in the National Industrial Equipment Reserve.

The Central Inventory Group will assist applicants in screening inventories of idle equipment. Such equipment will then be listed as available for on-site inspection by prospective users. Any machine must be accepted or rejected within fifteen days. On notice of acceptance the Central Inventory Group will issue shipping instructions to the appropriate government agency. At that time arrangements will be made to lease the equipment in accordance with procurement regulations.

Expansion Goal

July 1, 1953, has been set as the date for completion of an interim expansion goal for the precision screw-machine products industry, according to an announcement made by Ralph S. Trigg, deputy administrator of the Defense Production Administration for Program and Requirements. Added production capacity will require some \$15,000,000 in capital investment by the 1800 small business concerns comprising the industry. The normal annual volume is about \$230,000,000. In 1950, the total climbed to \$300,000,000, and in 1951 to \$400,000,000.

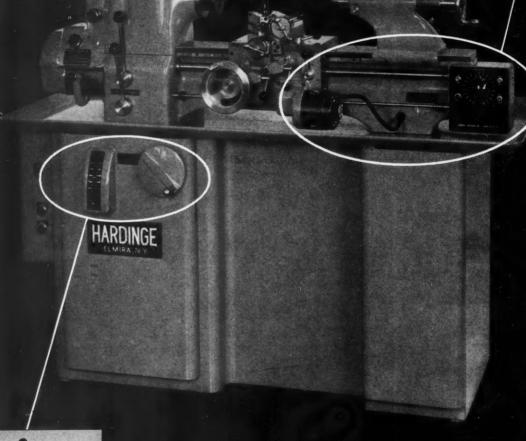


is a feature of the



Tool Room and Production Lathe

Variable Feed Drive for Carriage and Cross Slide



Variable Speed Drive for Headstock Spindle

Both drives are independent and infinitely variable to secure every possible combination of speeds and feeds within the following range:

Variable Speeds: 125 to 3000 r.p.m. Variable Feeds: ¼" to 7" per minute Write HARDINGE for Bulletin HLV

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

OFFICES IN PRINCIPAL CITIES. Export Office: 269 LAFAYETTE STREET, NEW YORK 12, N. Y.

Off Again, On Again in Government Buying

THIRTY-FIVE thousand machine tools to cost about half a billion dollars are to be ordered by the Air Corps and the Navy alone by the end of 1953—Army requirements are still being reviewed.

This additional business imposed on a heavy backlog of orders already held by the machine tool industry means continued prosperity for that industry within the predictable future. However, the industry right now is more concerned with the wholesale cancellation of machine tools ordered during the last two yearsand which have been produced only through exhaustive efforts on the part of management and personnel, and day and night operation of shops. Cancellations since the first of this year have amounted to more than one-third of the new orders. Nearly all of these cancellations have come from the Air Force or from its contractors and sub-contractors.

As Tell Berna, general manager of the National Machine Tool Builders' Association, recently pointed out, economically it is extravagant to cancel a machine tool order, pay termination charges, and then reorder the same type of machine a year or so later. Moreover, such a practice is bound to have a deleterious effect on the morale of both management and labor in the machine tool industry. They are certain to feel that time and effort have been

wasted which could have been utilized to better advantage in expediting the national defense program.

It is difficult to reconcile cancellations of machine tools with the new heavy orders in view of the fact that the Air Force calls machine tools the key to aircraft productivity and the most limiting factor in the program. Despite the heavy cancellations, machine tools are urgently needed to step up the production of jet engines.

Responsibility for this paradoxical practice is laid on the stretch-out policy and on changes in airplane design which necessitate different types of production machines. But even though the stretch-out policy has pushed into the future the immediate need for certain types of equipment, the logical policy would be to complete the purchase of the equipment now and hold it on hand for use when the time comes. Also, unless radical changes in the design of airplane engines and frames seem imperative, it would appear highly desirable to avoid detail alterations which seriously delay production schedules and do not greatly improve the performance of aircraft.

Machine tools cannot be built in a day the blame for airplanes ready for delivery except for engines should not be placed on the makers of production equipment.

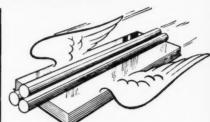
Charles O. Herb EDITOR



Which of these special-purpose steels do you need...NOW?

Call Ryerson for Quick Shipment

Right now, users of special purpose steels can get most of their requirements quickly—with one call to one convenient source. All the steels described on this page are in better-than-average supply at the Ryerson plant near you. All are high quality steels that conform to exacting specifications. Use this page to check the items you need, and save time by ordering them next time you call Ryerson.



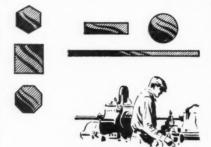
AIRCRAFT ALLOYS AND STAINLESS

Alloy bars, sheets and strip in more than 400 sizes, finishes, conditions. Stainless in more than 300, to meet all important aircraft specs.



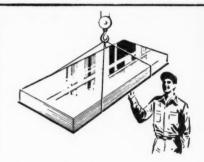
STANDARD ALLOYS

Rounds, flats, hex's, squares hot rolled and cold finished complete heat treatment guide with each shipment.



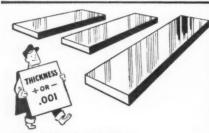
TOOL STEEL

Water, oil or air hardening tool steels. High in quality; economical in price. Hardening data with every shipment.



STRAIGHT CHROME STAINLESS

No allotment required for these stainless bars, plates and sheets. Can often replace restricted nickel-chrome types.



GROUND FLAT STOCK

High grade, non-deforming tool steel. Saves machining, speeds production. For accurate-to-size parts, tools, dies.



WELDED MECHANICAL

TUBING

Hot and cold rolled, rounds and squares in a wide range of sizes. Consider cost—substitute for seamless tubing.



Develops extremely high surface hardness after nitriding. Unequalled for parts subject to abrasion. Large stocks.

va of

tif

sta

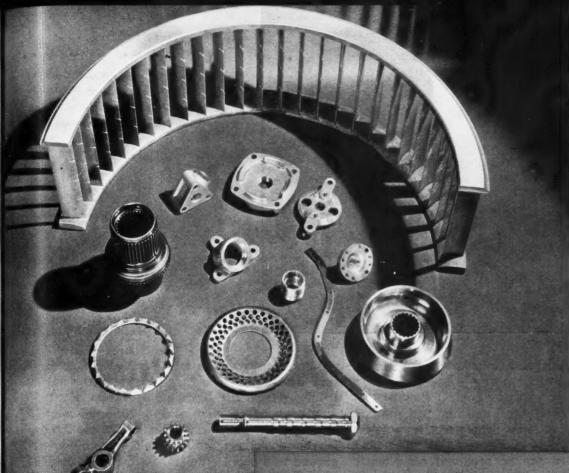
Co

ex me ha fin

OTHER PRODUCTS: CARBON STEEL BARS, STRUCTURALS, PLATES, SHEETS, ETC.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK . BOSTON . PHILADELPHIA . CINCINNATI . CLEVELAND . DETROIT
PITTSBURGH . BUFFALO . CHICAGO . MILWAUKEE . ST. LOUIS . LOS ANGELES . SAN FRANCISCO . SPOKANE . SEATILE



By DUDLEY J. KAHARL
Production Engineer
Pratt & Whitney Aircraft Division
United Aircraft Corporation
East Hartford, Conn.

Barrel Finishing Precision Turbo-Jet Parts

Barrel finishing is a fast and low-cost method of deburring, smoothing, or improving the surface finish of parts by revolving them in a barrel containing water, "lubricating" compound, and abrasive chips. It differs from conventional tumbling in that such variables as the contents of the barrel, its speed of rotation, and the length of cycle are all scientifically controlled to conform with prescribed standard procedures.

At the Pratt & Whitney Aircraft Division, United Aircraft Corporation, East Hartford, Conn., these procedures are the outcome of long experience and considerable practical experimentation. Close adherence to these procedures has resulted in an improved, more uniform finish on a steadily increasing volume and va-

riety of parts for turbo-jet and piston engines. Finishing costs have been reduced as much as 90 per cent over previous methods of hand filing, grinding, sanding, or polishing as a consequence of the saving in time, labor, and materials, the elimination of any reworking of the parts, and the reduction of scrap.

By varying the size and quantity of the abrasive chips, the amount of water in the barrel, the type of compound, the speed of barrel rotation, and the length of cycle, the method can be adapted to many different purposes. Barrel finishing is used to remove burrs, flash, tool marks, rust, heat-treating scale, paint, or plating; to blend chamfers, round corners, or form fillets; and to improve the surface finish or appearance of parts. Several such operations are

TROIT



Fig. 1. General view of one barrel finishing line at Pratt & Whitney Aircraft. The operator is placing an air-inlet swirl vane assembly in a barrel.

SO

di

ha

bu

ot in parto er battr

fin

fi

il

th

ti

h

is

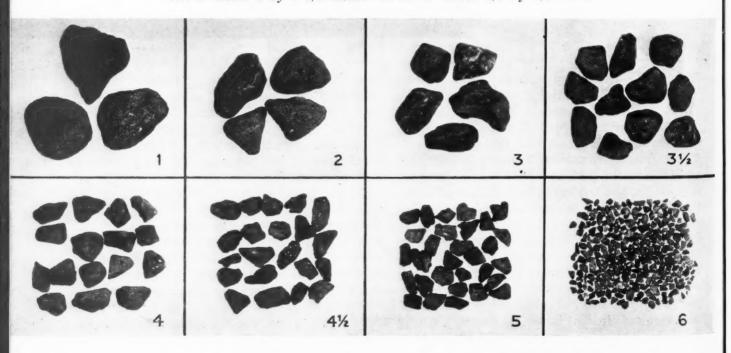
often accomplished simultaneously on one batch of parts.

Because of the exacting control exercised in repeating identical barrel finishing processes on successive batches of the same parts, close duplication of results is obtained. Also, fillets and rounded corners can be produced consistently to the required specifications. Fillets generated in barrel finishing are usually limited to a maximum radius of 0.050 inch, and edge radii to about 0.020 inch, since the time required to increase their size beyond these limits would be considerably greater. The surface finish produced on barrel finished parts will depend on

the decisions taken on each of the variable factors already mentioned, as well as on the finish resulting from the preceding operation. For example, a surface finish of 3, 8, 15, or 80 microinches r.m.s. can be obtained economically by barrel finishing parts previously machined or ground to a surface finish of 15, 35, 60, or 500 micro-inches, respectively.

The amount of stock that is removed from the work during barrel finishing can vary from immeasurable millionths to several ten-thousandths of an inch, depending upon the shape and material from which the parts are made, the contents of the barrel, and the cycle. In fact,

Fig. 2. Abrasive chips used for barrel finishing range in size from No. $1-about\ 2$ by $1\ 1/4$ inches $-to\ No.\ 6-about\ 1/8$ by 3/32 inch.



some applications are aimed at reducing the dimensions of over-size parts so that they are within the allowable tolerance. On the other hand, gears or threaded precision parts are deburred or smoothed without changing the involute form of their teeth or dimensions. Another benefit derived from barrel finishing is the improvement of the fatigue properties of many parts by removing directional scratches such as tool marks from their surfaces, and by strengthening the surfaces due to cold-working. Also, by barrel finishing certain parts prior to heattreating, distortion has been eliminated by virtue of the stress relieving action.

While Pratt & Whitney Aircraft was barrel finishing only about 200 parts two years ago, approximately 2500 different parts are now being processed by this method and the number is constantly increasing. A selection from the current wide range of aircraft engine parts finished in this way is shown in the heading illustration.

Printed operating procedures are given to the operators for each different part, which specify the amount and size of abrasive, the amount and type of compound, the amount of water, the number of parts per compartment, barrel speed, and cycle time. These procedures are carefully worked out by production engineering, as mentioned, on the basis of both previous experience and, where necessary with a new part, some practical experimentation. Castings, forgings, stampings, welded assemblies, and machined or ground parts made from steel, aluminum, bronze, or practically any other material can be finished by means of this process.

Care is required in finishing threaded parts having burrs on surfaces other than the threads since the threads might become under size. This problem can usually be solved by selecting the proper compound (in this case, one which yields a large volume of "suds" to reduce the cutting action of the chips), by using a high load of chips and water, and by rotating the drum slowly and for a short cycle. In some cases, it is more economical to reduce the heavy burrs to some extent by pre-burring by hand prior to barrel finishing. Another limitation of the process is that the shape of the part must permit the abrasive to make contact with all necessary

Fig. 3. Single-compartment small-diameter drums are used for barrel finishing small parts. The wire basket holds parts while vapor degreasing.

surfaces. Care must be exercised in barrel finishing parts having tiny cavities, narrow slots, or small-diameter blind holes into which the abrasive might become packed.

Dimensional tolerances on the work-pieces depend on the preceding operations and are not affected by the barrel finishing operation. All parts must be cleaned—preferably by degreasing—prior to barrel finishing, since oil will coat the abrasive and barrel and interfere with the abrasive cutting action.

Conventional horizontal, octagonal barrels, as shown in Fig. 1, have been found most suitable for this method of finishing. Such barrels vary in size and load capacity, and can have from one to six work-holding compartments. Fig. 3 shows a single-compartment drum for finishing batches of smaller parts. It is more economical to use this size barrel, operating at higher speeds, for small washers, pins, clips, etc., than to handle a greater volume of such parts in larger barrels. With the smaller barrel and less abrasive, handling of the parts is simplified. Beyond a certain point, any increase in the chip load will reduce the abrasive action because of retarded movement of the barrel contents.

Desirable features for barrels used in this finishing method are neoprene or rubber linings, variable-speed drives, and timing devices to



automatically stop the drive after a pre-set cycle time. With such a timing device, less supervision is required and barrels can be loaded and started even at the end of the working day. A periodic reversing mechanism is also a desirable feature when barrel finishing certain intricately shaped or racked parts. An electric overhead hoist, Fig. 4, is very useful for loading the chips into the barrel from the pans.

Slow barrel speeds—5 to 20 R.P.M.— are generally employed for the removal of heavy burrs, since higher speeds might cause such burrs to be rolled over rather than removed. These lower speeds are also used for delicate parts subject to distortion, and for the lighter alloys such as aluminum. Higher barrel speeds—20 to 50 R.P.M.—permit the faster removal of light burrs, produce smoother surface finishes, and remove scale, paint, or plating. In no case should the speed be high enough to throw the work or abrasive due to centrifugal force.

The abrasive chips employed for barrel finishing are of two kinds. One is a natural stone composed of thousands of tiny, sharp silica grains dispersed throughout a non-crystalline bonding mineral, and is used in barrel finishing parts requiring a fine finish, or where a minimum amount of metal is to be removed. The other (which is used much more extensively) is

emoval range finance finance finance force. The stone grassilica inguitalline platishing gritalline platishing

a heavy, synthetic stone having a ceramic, noncrystalline bonding agent and aluminum oxide cutting grains, and is preferred for higher rates of production and the removal of heavier flash, burrs, or tool marks. The natural stone chips are available in nine different sizes, and the synthetic in eight. Sizes of the synthetic chips are illustrated in Fig. 2—ranging from the coarsest (No. 1) having block-shaped grains that will pass through a wire mesh screen having openings 2 by 1 1/4 inches, to the finest (No. 6) that will pass through screen openings 1/8 by 3/32 inch. Such abrasive chips are wearand glaze-resistant, and provide a continuous, fast cutting action.

Barrel finishing is actually a low-pressure, random motion honing process. The weight of the chips and work-pieces determine the precise amount of cutting and polishing that will be accomplished in any fixed time, and is comparable to the pressure applied by hand or power feed in grinding. The coarser size abrasive grains are generally employed for rough-forming, rapid deburring, and removing scale, paint, plating, or tool marks. The size of the abrasive grits is an important factor in forming fillets or rounding edges, the coarser sizes being used for producing larger radii. Finer abrasive is used for smoother surface finishes; threaded, precision, or small work-pieces; soft and nonferrous alloys; and the preparation of surfaces for subsequent plating. Too fine an abrasive, however, may cause heavier parts to become nicked, since such abrasive offers little resistance to the movement of the work-pieces.

th

th

ar

al

W

th

01

se

to

ef

ar

si

aı

pe

qı

er

m

er

ot

be

is

is

sk

Another requirement is that the abrasive chips must be either large or small enough so that they will not become packed in cavities, slots, or holes in the work. When barrel finishing parts which have such openings, fine abrasive is sometimes mixed with coarse so that the otherwise inaccessible areas can be reached while still rapidly deburring the parts.

In most cases, sufficient abrasive is required to completely envelop each work-piece. The ratio of abrasive to parts, by volume, can vary from 2 to 1 to 8 to 1, with the smaller ratios generally employed for smaller work and the higher ratios for larger parts. A common ratio for medium-size work is 3 parts abrasive to 1 part work.

Fig. 4. An electrical overhead hoist is employed to conveniently load the abrasive chips into the work-holding compartments on the barrel finishing line.

Fig. 5. A water-soluble compound is added to the barrel finishing aggregate to lubricate or cushion the parts and clean the work and chips



Although the abrasive chips retain their cutting efficiency, they wear down gradually and their size should be checked periodically. Chips that have grown smaller can be screened out and re-used for jobs requiring a finer size of abrasive. Otherwise, the original finishing cycle would have to be lengthened to compensate for the slower cutting action.

A good "lubricating" compound having various additives is required in barrel finishing to serve one or more of the following functions: to soften the water; to provide a cushioning effect by means of foaming; to clean the parts and chips and prevent dirt from recoating the work; to prevent loading or glazing of the abrasive; to promote the desired color on the surface of the parts; to deoxidize the work surface; and, with ferrous parts, to inhibit rusting.

Selection of a particular compound will depend upon the metal being finished and the requirements for the finishing operation. In general, such compounds are water-soluble chemical mixtures containing soaps, detergents, deoxidizers, rust inhibitors, wetting agents, mild alkalis or acids, foaming agents, and, where necessary, other additives for special purposes. Compound being added to a charge of abrasive and work is shown in Fig. 5.

For maximum abrasive cutting action—which is desirable in rapid deburring—the compound should have little or no cushioning ("lubricating") effect. However, to obtain a smooth sur-

Fig. 6. Work-pieces can be separated from the abrasive by unloading onto a screen. Abrasive falls through into a pan and the parts are retained on the screen. face finish, foaming agents, soaps, wetting agents, or similar lubricating materials that prevent metal-to-metal contact are necessary. The degree of acidity or alkalinity of the compound, as measured by its pH reaction, will depend on the metal being finished or the color desired on the surface of the work.

Slightly acid compounds are generally employed for non-ferrous alloys such as brass, bronze, and aluminum; strongly acid compounds are selected for descaling operations. After



using such acid compounds, it is necessary to rinse the barrel and chips thoroughly, neutralize with a strongly alkaline compound, and then rinse again. Alkaline type cleaners are usually employed for barrell finishing of steel parts.

Water to be used for barrel finishing should not be too hard or contaminated, since the surface finish obtained might be affected. The water serves as a carrier for the work, abrasive chips, and compound, also provides a cushioning action. The exact amount of water to be added to each charge can only be determined from experience. In general, however, less water reduces the cycle time but makes it more difficult to obtain a smooth surface finish. For a finer finish, more water is usually added to retard the abrasive cutting action by increasing the film and hydrostatic pressure separating the parts and the abrasive. A higher water level is also desirable for finishing fragile or precision parts that might become distorted or damaged. A low water level with a large amount of compound should be avoided in barrel finishing parts having small openings as the compound might become packed in such recesses.

The number of parts to be finished per barrel

compartment depends primarily on the size of the parts but must also be selected on the basis of experience. By increasing the number of work-pieces and decreasing the amount of abrasive on successive runs, the optimum conditions can soon be determined. While most parts can simply be loaded unsecured into the barrel compartments, it is sometimes desirable to mount heavy or intricately shaped work-pieces on fixtures. This will prevent the parts from becoming nicked by contact with each other, and a much finer and more uniform surface finish is obtained. Different parts can be barrel finished together if they are of the same material and approximately the same weight, have the same finish requirements, and require the same size abrasive. Edges that must be kept sharp, and holes or other openings that it is not desirable to abrade, should be masked or plugged with plastic, lacquer, rubber, putty, or some similar material before barrel finishing.

The time required for barrel finishing will vary with the material being finished, the design of the part, and the finish requirements. Non-ferrous alloys such as brass, aluminum, or zinc can be finished in from fifteen minutes to

Turbo-Jet and Piston Aircraft-Engine Parts that are Abrasive-Finished in Barrels

				arts	An	nount of	Aggrega	te		ař .	
ple	Part	Material	Operation	Number of Parts per Compartment	Abra	asive	Comp	ound	Amount of Water	Barrel Speed, Revolutions per Minute	Cycle Time, Hours
Example				Numb per C	Pounds	Type*	Pounds	Туре		Barra Revo per N	Cycle
1	Flanged Collar	Steel	Remove Burrs and Smooth Surface	2500	200	4 1/28	1/4	2	Level with Mass	33	3
2	Threaded Nipple	Aluminum	Remove Burrs without Changing Thread Dimensions	1500	500	5N	1	1	4 Inches Above Mass	16	1
3	Flanged Bearing	Aluminum	Remove Burrs and Smooth Surface	300	500	4 1/28	1	1	3 Inches Above Mass	16	1
4	Valve	Steel	Remove Tool Marks and Burrs	1000	25	38	1/2	2	Level with Mass	30	4
5	Vane	Stainless Steel	Smooth and Round Edges	300	500	38	1/2*	2	2 Inches Above Mass	-24	6
6	Dome-End Plug	Brass	Remove Tool Marks and Burrs	8000	25	4 1/28	1/4	1	Level with Mass	35	1
7	Ring	Steel (Tubing)	Remove Heavy Burr and Smooth the Faces	4000	25	4 1/2S	1/4	2	Level with Mass	55	2 1/2
8	Shroud Ring	Stainless Steel	Remove Burrs and Improve Surface Finish	1	700	4 1/2S	1 1/2	2	6 Inches Above Mass	12	1
9	Swirl Vane Assembly	Magnesium	Remove Burrs and Improve Surface Finish	1	800	48	1	,1	3 Inches Above Mass	10	3/4
10	Threaded Bushing	Aluminum	Remove Burrs with- out Changing Thread Dimensions	400	600	58	1	1	2 Inches Above Mass	10	1

^{*}S refers to synthetic and N to natural stone.

Fig. 7. Shadowgraphs of a threaded aluminum bushing, shown before deburring (top), and after barrel finishing (bottom)

of

is

of

a-

ns an nnt хna is ed $^{\mathrm{nd}}$ ne ze nd ole th ar

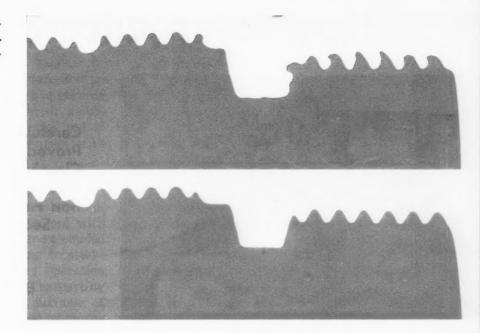
ill

le-

ts.

or

to



two or three hours, while stainless steel or some of the tougher heat-resistant alloys may require as long as eight hours. A finer surface finish can usually be produced on the harder steels, but a longer finishing time is required. By selecting the proper barrel finishing procedure, a surface can be obtained which is suitable for subsequent plating operations.

At the completion of the barrel finishing cycle, the work-pieces are separated from the abrasive by unloading onto a screen, as shown in Fig. 6. The mesh permits the abrasive to fall through into a pan for re-use, while the finished parts are retained on the screen. Magnets can also be used to separate ferrous parts from the abrasive, and specific gravity separators or air-float units are sometimes employed for small parts.

The finished parts are rinsed with hot water, dried in air, and, if made from a ferrous material, dipped in oil to preven corrosion. Work should never be allowed to remain in the moist abrasive too long, for if the powdered abrasive dries on the parts it is difficult to remove and might cause trouble in subsequent machining, welding, or plating. Before processing another batch of parts, it is essential that any sludge be removed from the chips by washing with a mild cleaning compound and then rinsing with water. This cleaning increases the cutting action of the chips in their next load.

Specific data as to aggregate make-up, barrel speed, and cycle time for a selection of turbo-jet and piston engine parts now being finished in this way at Pratt & Whitney Aircraft are given in the accompanying table. Precision finished

shroud rings for turbo-jet engines, Example 8, are now completely deburred, edges are rounded, and their surface finish is greatly improved in a barrel finishing cycle of only one hour. Previously, with manual deburring methods each part required five and one-half hours. To avoid nicking the precision finish, only one part is placed in each compartment, but since the barrel employed for this operation has a double compartment, two parts are finished per cycle. One and one-half pounds of compound is added to the compartment for each cycle, but the abrasive chips are reused indefinitely, it being necessary only to flush the chips with water between cycles.

A surface finish of 25 to 30 micro-inches r.m.s. is obtained and all burrs are removed by barrel finishing the magnesium swirl vane assemblies for turbo-jet engines, Example 9. One of these air-inlet swirl vane assemblies, about 24 inches in diameter by 6 inches wide, is shown being placed in a barrel compartment in Fig. 1. A saving of two hours per split half, or four hours per complete circular assembly, has resulted from the barrel finishing method on this particular part.

Threaded aluminum bushings, Example 10, are placed in the barrel just as they come from the automatic screw machines. The excellent results obtained by barrel finishing this part to remove burrs are strikingly represented in the shadowgraphs, Fig. 7, which show a threaded bushing before deburring (top), and the same part after barrel finishing (bottom). The barrel finished bushings have a smoother surface finish, and there is no change in their thread contour.

How to Produce High-Quality

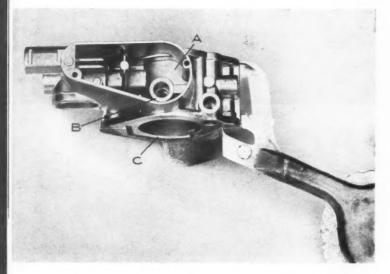


Fig. 8. This governor body is one of nine different models produced by the same die.

Carefully Selected Die Steels, Proved Design Principles, and Closely Controlled Die-Casting Alloys are Important Production Factors at the Hoover Co. Second of Two Articles

By HENRY H. RYFFEL

In the first installment of this article, published in June MACHINERY, some of the dies used to produce aluminum die-castings at the Hoover Co., North Canton, Ohio, were described. Other dies which illustrate good die-casting and die-casting die design are here described, particularly with reference to the method used to produce cored openings in the casting.

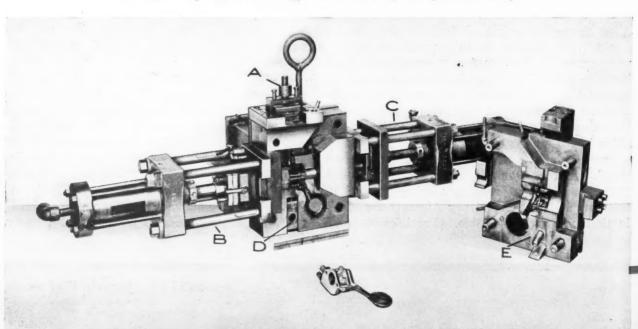
Die with Interchangeable Cores

The governor body in Fig. 8 is one of nine different models which are produced by the same

die. The die used to make this part has three hydraulically operated cores and one cam-operated core, as shown in Fig. 9. The hydraulic cylinder used to operate core A has been removed, but the cylinders for cores B and C are shown. Core D is operated by the cam action of pin E as the die halves are closed or separated. Cores A, B, C, and D may be replaced by cores of different diameter so that the same die utilizing interchangeable cores can be used to produce nine models of the governor body.

The float chamber A of the governor body (Fig. 8) contains a cored hole B, the top surface

Fig. 9. Die used to produce part shown in Fig. 8. Cores (A), (B), (C), and (D) may be replaced by cores of different diameter so that the same die can be used to produce nine different models of the governor body.



Aluminum Die-Castings

of which is used as a bearing surface for an ejector sleeve. The small rim left by the peening action of the ejector sleeve is removed in a subsequent milling operation which is required to finish this surface to a close dimension with respect to the center of bore C.

Before sleeve ejection was adopted, it was necessary to provide two extra ejector pads in the float chamber and to remove these in a separate operation, since the pads interfered with the movement of a float which is later assembled into the float chamber. By resorting to sleeve ejection, therefore, an extra milling operation on the die-casting was eliminated. The parting line of this die is so arranged that surfaces of the casting which are later to be sealed by means of gaskets are kept free of flash, eliminating the need of extra finishing operations.

Use of Large Cores Moving at an Angle

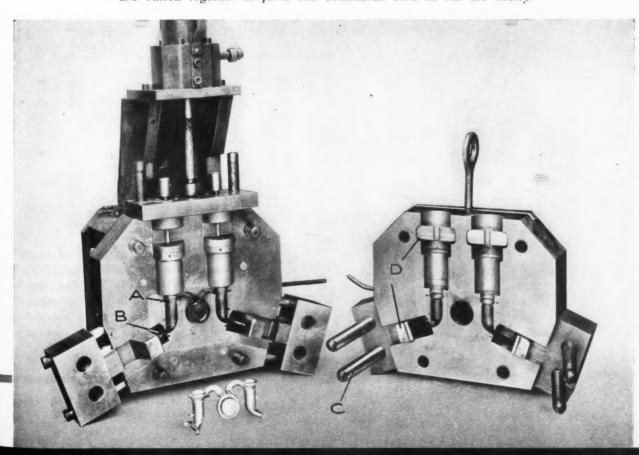
A part that requires the use of two cores to produce an opening which runs completely through the casting is illustrated by the furniture brush nozzle shown in Fig. 10. The two-cavity die used to produce this part is designed so that when the two cores are locked in place



Fig. 10. Opening in vacuum cleaner nozzle is produced by two cores moving at an angle.

they produce one continuous core throughout the casting cavity. As may be seen in Fig. 11, the larger of these two cores A is actuated hydraulically from the top of the ejector die, and the smaller core B, which comes in at an angle, is operated by the action of the cam pins C when

Fig. 11. Two-cavity die used to produce castings shown in Fig. 10. Hydraulically actuated cores (A) and (B) – core (B) shown partially retracted – are butted together to form one continuous core in the die cavity.



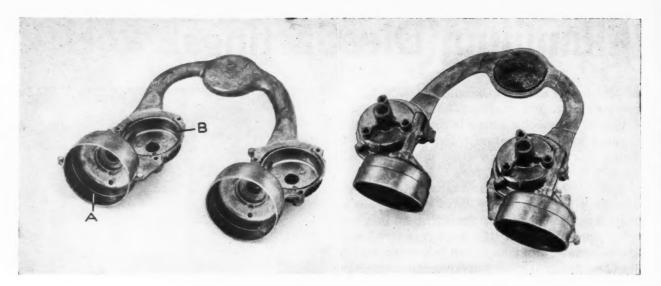


Fig. 12. This windshield wiper housing consists of two cup-shaped chambers offset from each other at an angle somewhat less than 90 degrees. Each chamber has cored openings.

the die is closed or opened. Both cores are locked in position by cam locks D when the die halves are closed. The small ears A on the bottom side of the nozzle, Fig. 10, are used for ejection and are later removed, leaving the casting free of ejection marks. The gate for this part runs completely around the top of the casting and provides uniform flow of the metal during the shot, thereby eliminating premature freezing of the metal during injection.

The housing shown in Fig. 12 consists of two cup-shaped chambers offset from one another somewhat less than 90 degrees. Chamber A is

produced by hydraulically operated core A in Fig. 13, and chamber B by stationary core B in the ejector die. Core A, in addition to forming the upper chamber A, forms a hole connecting with chamber B, as may be seen in Fig. 12. The core locks C (Fig. 13) serve to accurately position the movable cores and to prevent any movement during the shot.

It will be noticed that all ejector marks are located on the interior surfaces of the casting where they will not be visible on the finished part. With the exception of trimming the flash, no further machine operations are required on

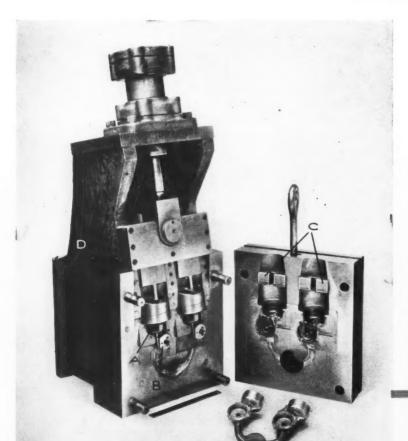
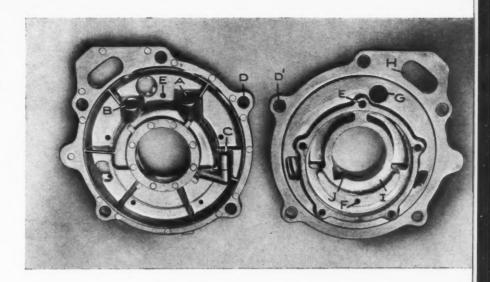


Fig. 13. Two-cavity die used to produce die-castings seen in Fig. 12. Core (A), in addition to forming one of the large cavities in the finished part, also forms a passageway connecting the two cavities in the casting.

Fig. 14. This pump body is produced in a two-cavity die which utilizes stationary cores and pinion-actuated cores to produce the many holes and openings required.



this part. Typical of all Hoover dies which utilize hydraulically actuated pulls, the frame D is of heavy cast construction to provide ample strength and rigidity.

n

n

Die with Rack-and-Pinion-Actuated Cores

The pump body shown in Fig. 14 is a representative example of a complex part that was successfully die-cast. Cored holes A and B are at an angle of 18 1/2 degrees from the vertical. The cores for these holes are operated by means of a rack-and-pinion arrangement, the pinion being turned by a linkage connected to the square pinion extension A seen in Fig. 15. The core for producing the vertical hole C, Fig. 14, is also actuated by this pinion. All three cores are locked in place by means of the three core

locking pins B, Fig. 15. The five cored holes D, Fig. 14, have chamfers on both sides of each hole. Two core pins are used for each of these holes—a core pin C in the ejector die which produces the hole D and the chamfer on one side, and a core pin C' in the cover die which produces the chamfer D'. Core pins C and C' are butted together when the die halves are closed.

Cored holes E require a chamfer on one side only; hence, only one pin is required for each hole. The blind hole F is also produced by a single chamfered core pin, as is also the case with hole G. The slotted opening H again requires the use of two core pins since the slot has a chamfer on both sides of the opening.

The large hole I is formed by two cores. The core in the cover die produces one-half of the depth of the hole, including the V-notch J.

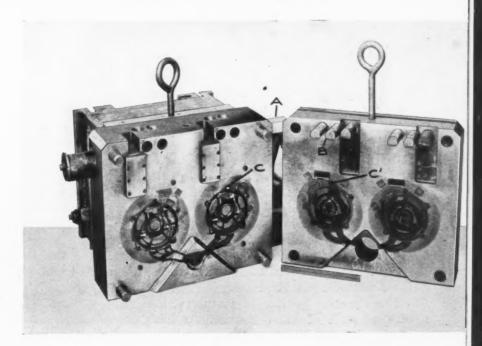


Fig. 15. Two-cavity die used to produce part shown in Fig. 14. This die is an excellent example of how advanced tool design can be employed to facilitate production of complex parts.



HEN it is realized that a center distance error of only 0.002 inch between two critical holes in a periscopic sextant causes a service error of two and one-half miles, the need for exacting procedures in aircraft instrument manufacture is made quite obvious. In fact, instruments that will accurately indicate the slightest change in plane position or performance under extreme variations in temperature and pressure, continuous vibration, and for long periods of time without repair, require construction more precise than the finest watchmaking.

For almost a quarter of a century, hundreds of thousands of these instruments have been produced for military and commercial aircraft by the Kollsman Instrument Corporation, Elmhurst, N. Y., a wholly owned subsidiary of the Standard Coil Products Co., Inc. From a one-man laboratory in 1928, Kollsman is today a major supplier of aircraft instruments—flight instruments such as many types of altimeters, air-speed indicators, compasses, and rate-of-climb indicators; and engine instruments such as tachometers, synchroscopes, manifold pressure gages, generators, and remote indicators.

With the range of flight widening constantly and with planes flying faster and at higher altitudes, instruments have become even more precise and intricate. Coupled with this is the trend in aircraft instrument system design from indication only, to complete automatic control of

Require Precision of Hand and Machine

By EDGAR ALTHOLZ

flight. Electronic, mechanical, and optical components make up these systems, among which are navigation and automatic pilot computers, cabin pressure control systems, and various servo systems.

Instrument precision starts with precision of mind, hand, and machine. Delicate mechanisms often contain near-microscopic parts and require practically infinitesimal tolerances. It is the rule, rather than the exception to the rule, to work in ten-thousandths of an inch—not only in the grinding room, but in metal-cutting and assembly operations as well. Like other aircraft elements, instruments are in a constant state of

development and perfection, and no one model is "frozen" long enough to be produced continuously in large quantities. This precludes the use of specialized machinery or elaborate jigs and fixtures that would simplify the manufacturing process.

The problem of the instrument manufacturer, then, is to follow the most exacting specifications of clearance, center distance, parallelism, and concentricity by mainly using conventional machine tools, stock cutters, and standard gages. Under such circumstances, a large proportion of shop personnel must naturally be composed of highly skilled workers. Close attention to

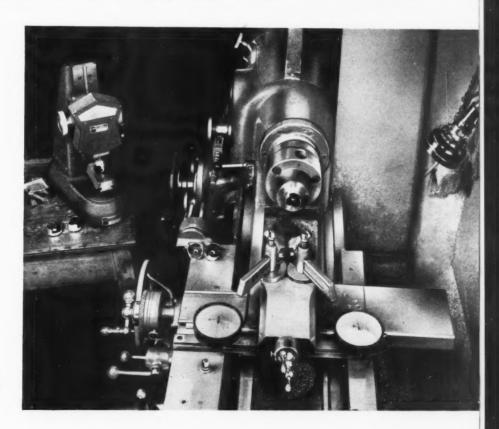


Fig. 1. Indicators on the crossslide saddle facilitate lathe work in "tenths,"

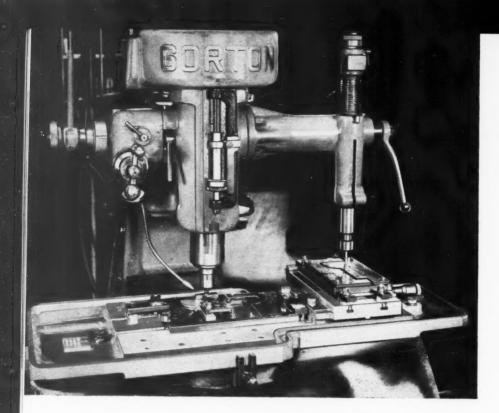


Fig. 2. Precision duplicating machines such as the one here shown maintain accuracy of contours of duplicate parts.

si

Ir di cu ti:

O O

of m pr m pa m be

co

cr

m

pl Tl

ab cis Go ta is

on

Fi up gr th

be

T

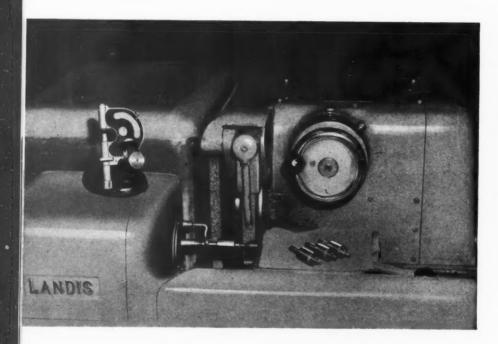


Fig. 3. Whenever a high degree of concentricity becomes a factor, shaft assemblies are ground between centers.

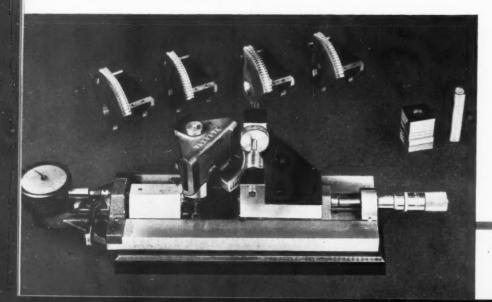


Fig. 4. This gear-checking fixture is highly practical where product design is never actually "frozen."

Fig. 5. The turret adapter on this jeweler's lathe permits three operations to be performed without disturbing the work or resetting the tools.

size control is evident in every department. For example, all stock in the automatic screw machine department is run through a centerless grinder before being brought to the machines. In this way, the stock is made perfectly cylindrical and can be concentric with other surfaces cut on the machines to within 0.0003 inch. Sometimes these other surfaces are mere needles of 0.014 inch diameter.

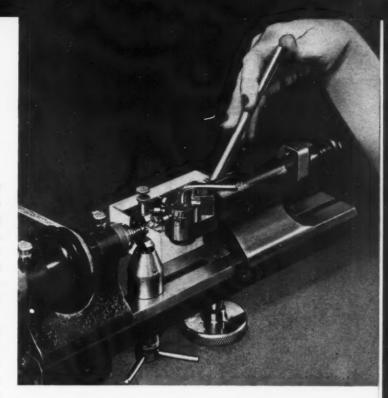
Turning and boring in "tenths" are common practice in the lathe department at Kollsman. Oversize Federal dial indicators calibrated in 0.0001 inch are mounted on the cross-slide saddle of each lathe, thereby enabling the operator to make direct readings of the required degree of precision. Two of these indicators are shown mounted on the Monarch lathe in Fig. 1. The part being machined, a rear-end bell for a small motor, has a highly critical outside diameter and bearing groove. These surfaces are machined consecutively by the lathe tools carried on the cross-slide. Each cutter is located radially by means of its corresponding dial indicator.

Many instrument parts are traced from templates on pantographs or duplicating machines. The combination of skilled personnel, highly sensitive equipment, and carbide end-mills enables these operations to be completed with precision and speed. In the close-up view of the Gorton duplicator, Fig. 2, a side plate for a sextant is shown being machined. The finished part is accurate to within 0.0005 inch of the template.

Sub-assemblies and parts not readily turned on the lathe or screw machine are ground to finished size. As would be expected, tolerances are particularly small in the grinding room. Fig. 3 shows a small rotary shaft assembly set up between centers on a Landis cylindrical grinder. A size comparator at the machine gives the operator an immediate check on his work.

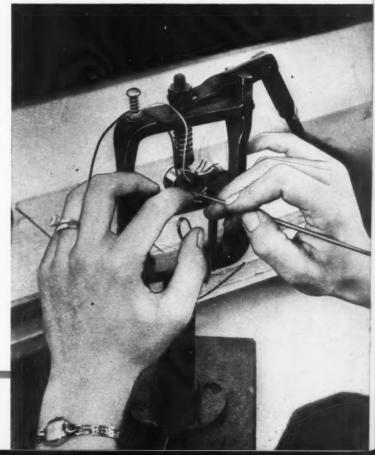
When a series of sequential operations had to be performed on a jeweler's lathe, a tailstock turret adapter was designed, as seen in Fig. 5. The three-station turret makes it possible to spot, drill, and ream a hole in a sector locating

Fig. 6. One of the most delicate assembly operations is packing coils of fine wire into stator slots.



shaft without disturbing the part. The 0.0444-inch reamed hole has a tolerance of plus 0.0002 inch minus 0.0003 inch. A small steadyrest assures concentricity between the hole and an outside diameter.

For any of the various operations involved in the assembly of a precision instrument, deft fingers must be combined with inexhaustible patience. One typical operation, Fig. 6, is that of inserting coils of very fine wire in the slots of stators used in small motors and generators. Three hundred of these wires, 0.0028 inch in diameter, are packed in each 0.026-inch slot.



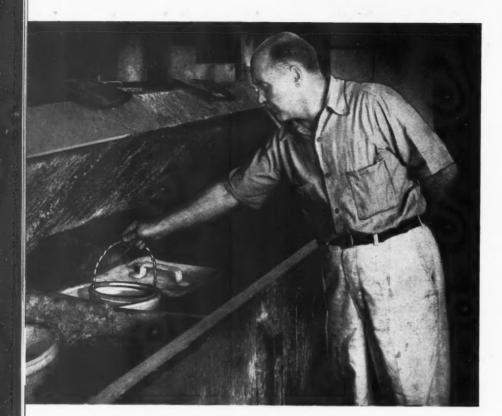


Fig. 7. Dissolving burrs in acid rather than filing them has saved considerable time.

Rigid inspection is a necessary complement to precision manufacture. Like the various metalcutting and assembly operations, it is generally more practical to adapt standard inspection units rather than make special ones, because of production limitations. For example, a standard gear-checking fixture, Fig. 4, has been conveniently adapted to measure the center distance of a prism mount sector and worm assembly.

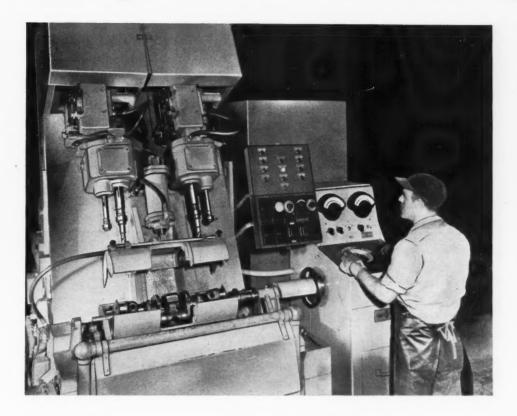
Even a slight burr left by milling slots in screw-heads can destroy the accuracy of an instrument. Recently the time-consuming operation of deburring was greatly simplified by introducing an acid dip in the making of screws. The screw blanks are turned 0.002 to 0.003 inch over size, slotted, then immersed in a solution of muriatic acid for a few minutes, as shown in Fig. 7. The dip is sufficient to dissolve the burrs, after which the blanks are tumbled, centerless ground to size, and thread-rolled.

Airborne instruments must be compact as well as precise. It is no surprise then that pins, screws, and springs are so minute that a jeweler's magnifying glass and tweezers are the stock in trade of the instrument assembler. Fig. 8 shows a true air-speed indicator subassembly operation. With this instrument, accurate indication of the exact speed in milesper-hour at which a plane is flying is immediately available to flight crews, thus eliminating involved computations and possible human error.



Fig. 8. Sub-assembly operation on an instrument which has greatly facilitated effective pin-point precision bombing

Dynamic Balancing of Crankshafts Accomplished Automatically



Amount and Angular Location of Dynamic Unbalance in Automotive Crankshafts are Automatically Obtained, and Holes of the Required Depth are Drilled in the Crank Counterweights on Tinius Olsen Balancing Machines at Ford's New Engine Plant in Cleveland

By CHARLES H. WICK

NBALANCE of automotive crankshafts must be corrected to reduce vibration, provide quieter operation, lengthen bearing and engine life, and insure efficient operation. Determining the amount and angular location of unbalance in crankshafts and correcting the unbalanced condition were for many years slow costly operations which required skilled personnel. With the old and now obsolete methods of balancing, it was necessary to use three or more machines for rough or preliminary balancing, drilling to correct the unbalance, final balancing, and possibly, drilling and balancing again.

Now, crankshafts for Ford's new overhead valve six-cylinder engine are completely bal-

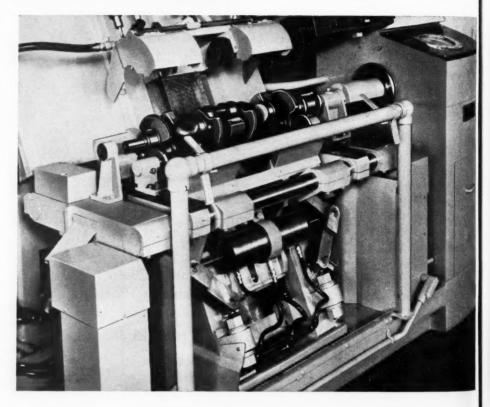
anced—including drilling to correct the unbalance—on one machine. A battery of seven of these machines, among the first to be used in the automotive industry, is currently being employed at Ford Motor Co.'s new engine plant in Cleveland, Ohio, to automatically place the crankshafts within 0.3 ounce-inch of perfect dynamic balance.

The machines (one of which is shown in the heading illustration) are made by the Tinius Olsen Testing Machine Co., and consist essentially of a standard dynamic balancing machine in combination with two drilling heads and a special fixture. Electronic devices and servo-mechanisms are provided so that a crankshaft can be automatically balanced without being



Fig. 1. Amount and angular location of dynamic unbalance in automotive crankshafts can be observed on dial-indicating instruments.

Fig. 2. Crankshaft is supported on rollers in a carriage that is flexibly mounted on cantilever supports which permit vibration.



removed from the machine. An outstanding feature is the Electrodyne unit, often called the "memory brain" of the electronically controlled machine. This unit automatically gives the angular location and the amount of dynamic unbalance, and transmits its electrical signals to set the drills for the correct depth of holes and reference pointers for the angular location of the unbalance.

Since the depth of hole to be drilled to correct the unbalance is automatically pre-set, there is no need for the operator to take readings or to physically set the depth to be drilled. This feature reduces the amount of effort and skill required on the part of the operator, eliminates any chance of error due to the human element, and increases the efficiency and accuracy of the balancing operation. However, both the amount and angular location of the unbalance can be observed on the two dial-indicating electrical instruments seen at the right in Fig. 1. The angle-indicating reference pointers, which are also automatically pre-set by the Electrodyne unit, are located in the "scanning screen" seen below the indicating instruments. It is only necessary to align the reference pointers with

lines scribed on the face of the screen by rotating a handwheel mounted on the side of this control box. This action rotates the crankshaft to the required position for drilling.

In operation, the crankshaft is manually placed on the carriage of the machine, being supported on two of its main bearing surfaces by two rollers provided at each end of the carriage, Fig. 2. By sliding the part to the right, two pins projecting from the driving head enter holes previously drilled in the flange of the crankshaft. The operator then depresses a starting button, thus energizing a timing motor, which controls the measuring cycle of the machine, and starting the driving motor. Since the carriage is mounted on flexible cantilever supports, any dynamic unbalance present in the crankshaft will cause the carriage to vibrate. A flexible coupling is provided between the driving motor and the work so as not to interfere with this vibration.

During this automatic measuring cycle, with the crankshaft rotating at about 600 R.P.M., pivots are successively brought into contact with first the flange end and then the opposite pulley end of the work. Each pivot rigidly clamps one end, preventing it from vibrating. A transducer is also provided at each end to pick up the deflection magnetically. With one end clamped by a pivot, the transducer at the opposite end of the crankshaft sends electrical signals—proportional to the amount of unbalance-to the dialindicating electrical instruments. From here they are sent to servo systems, computers, and sequence controls for drilling the correct depth holes at the required angles. The pivot at the pulley end of the crankshaft is then automatically closed, the pivot at the flange end opens, and the unbalance is again measured. All of

es it, ne nt oe al ne re

n

ly

the information transmitted to the electronic "memory" unit of the machine is retained until the cycle is completed.

Depths of the holes to be drilled in the counterweights at both the flange and pulley ends of the crankshaft are controlled by cams. The cams are rotated to the required position by servomechanisms that receive the electrical signals from the Electrodyne unit. Simultaneously, the angle-indicating reference pointers, Fig. 3, are positioned by other servomechanisms.

After the angular location and amount of unbalance servos for both ends of the crankshaft have been actuated—requiring about twenty seconds—the driving motor is automatically braked to a stop. The operator then manually rotates the work by turning the handwheel, Fig. 4, to align the blue-tipped angle-indicating reference pointer with the center line scribed on the face of the scanning screen. This insures that the right-hand flange end of the crankshaft is in the required angular position for unbalance correction drilling. The operator then presses the right-hand drill operating button which automatically raises the crankshaft from the cradle roller-supports, lowers an air-operated clamp (seen at left in Fig. 4) to lock the work in position, and starts the drilling cycle.

The drill head, made by the W. F. & John Barnes Co., is automatically fed downward at a rapid rate, and changes to the drilling feed rate when the 1-inch diameter drill reaches the work. While Fig. 4 is not an actual operation photograph (the crankshaft has not been lifted from the rollers and the guards are not in place), it does show the location of the right-hand drill as it is about to enter the counterweight. Depth of hole is controlled by a drill follower-arm contacting the pre-set, variable-

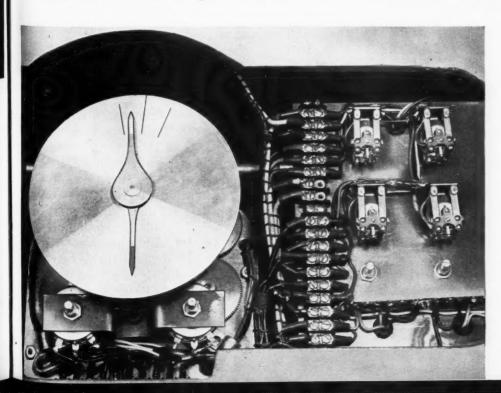


Fig. 3. Scanning screen of the automatic dynamic balancing machine seen in the heading illustration. Reference pointers indicate the angle of unbalance.



Fig. 4. Position of the drill as it is about to enter a counterweight on the crankshaft to remove required amount of stock for correcting unbalance.

position depth cam. When the proper depth hole has been drilled, a solenoid becomes energized to return the drill head, clamp, and crankshaft to their original positions.

The operator again manually rotates the work, this time to align the yellow-tipped, angle-indicating reference pointer with the center line scribed on the face of the scanning screen. This automatically places the left-hand pulley end of the crankshaft in the correct angular position for drilling. The operator then presses the left-hand drill operating button. The work is again lifted and clamped, and the left-hand drill head automatically completes its cycle to remove the correct amount of stock.

If the unbalance of the crankshaft exceeds 11 ounce-inches, it is necessary to drill more than one hole in one or both ends of the crankshaft, and a right- or left-hand "split-drill" signal light on the control board of the balancing machine becomes illuminated. This is automatically accomplished by the depth-cam servo, which, when it has rotated the equivalence of a hole 1 1/2 inches deep, operates a microswitch controlling the signal light and resets the depth-cam servo the proper amount for drilling two holes. In such cases, the reference pointers are aligned with the lines scribed either side of center on the face of the scanning screen.

If the unbalance of the crankshaft falls in such an angular position that it cannot be corrected by using the 1-inch diameter drills, the crankshaft can still be corrected without removing it from the machine. Noting this condition from the marking on the scanning screen, the operator removes the 1-inch diameter drill and mounts a 7/16-inch diameter drill in the second spindle of the drill head, drilling in the lighter counterweights at the ends of the crankshaft. This operation is termed "auxiliary drilling," its purpose being to make the unbalance of the crankshaft fall in the angular range of the main counterweight so that it may be corrected on the automatic cycle. This is the only manual operation required, and is used very infrequently.

To inspect the crankshaft for dynamic unbalance, the operator depresses the "measuring" button. The crankshaft is again rotated by the driving motor, and the cycle used to obtain the initial unbalance readings is repeated. This time, however, the operator observes the dialindicating electrical instrument (which he did not have to watch before) to see that the dynamic balance is within the specified 0.3 ounceinch tolerance. Also, if the crankshaft is balanced within the required limits, green signal lamps become illuminated on the control board. If not, red lights indicate which end of the work requires additional correction drilling. After unloading, the machine is ready to receive the next crankshaft for balancing.

Production obtained in this operation is greatly affected by the unbalance encountered in various crankshafts. In manufacturing several million crankshafts during the past few years, only two or three have been found that did not require any corrective drilling.

High-Speed Trepanning with Carbide-Tipped Tools

Typical Procedures and Some Characteristic Performances Obtained in High-Speed Trepan-Boring with Carbide-Tipped Tools. Details of Tool Design and Maintenance are Also Described in This Second of Two Articles

ETAILS of the equipment and methods employed by Walter Somers, Ltd., of Halesowen, near Birmingham, England, for high-speed trepanning of long bores with carbide-tipped tools were described in the first installment of this article, published in June, 1952, MACHINERY. Typical trepanning procedures, some characteristic results, and details of tool design and maintenance will be discussed in this concluding installment.

An example of procedure and performance is afforded by the following outline of the methods adopted in boring a gun barrel forged from nickel-chromium-molybdenum steel. The forging is first set up between centers, is roughturned all over, and two bands, 3 to 6 inches wide, are finished smooth and parallel for subsequent engagement with the roller steadyrests. At the same time, a band 12 inches wide is finishturned at the muzzle end for setting-up purposes. The centers employed in setting up for the rough-turning operation are left in, and are also used in trepan-boring, so that concentricity of the various locating bands with the axis of rotation is insured. This is essential, as any eccentricity would give rise to detrimental vibration at the high speed of rotation employed during trepan-boring.

The forging, which is 23 1/2 feet long, is then set up in the trepanning lathe and supported temporarily between removable centers, with its muzzle end toward the chuck. One center is mounted in an adapter bushing in the chuck body, and is accessible for removal through the apertures in the lantern fixture, while the other is rotatably mounted in the oil-seal head. With the work thus held, the rollers of the work steadyrests are engaged with the bands, and the chuck jaws are closed on the muzzle. A fourjaw independent chuck is employed and, during closure of the jaws, concentricity of the work is checked by means of a dial gage. The temporary centers are thereupon removed, and a pilot hole is bored in the breech end to a depth of approximately 1 inch.

The pilot hole, which is of the same diameter as that to which the trepanning tool has been ground, is formed with a slide-rest tool of the type shown in Fig. 9. Of high-speed steel, this tool has cutting edges that are grooved to reduce the width of the chips, in order to facilitate clearance. After boring the pilot hole, the tool and toolpost are withdrawn clear of the work, and the pressure-head driving ring is assembled to the breech end. During the assembly of the ring, care is taken to insure that it is accurately concentric with the work. The trepanning head is next screwed tightly to the end of the boringbar, and, with the cutting tool in the upper vertical position, is entered by means of the bar saddle to a depth of 3/4 inch.

The boring-bar steadyrest supporting the pressure-head is then traversed forward and the driving pegs are engaged, the oil-sealing ring at the front of the pressure-head meanwhile be-

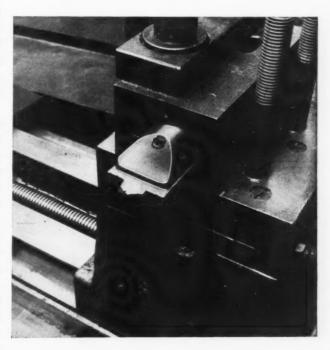


Fig. 9. Cutting tool mounted on the slide-rest and employed for forming the pilot bore in the end of the work prior to high-speed trepan-boring

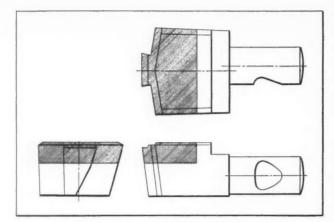


Fig. 10. General proportions of one specific size of a carbide-tipped tool for high-speed trepan-boring

ing pressed firmly against the end of the work. Adjustment of the segmental wooden bushing is effected as described in the first article, and the second bar steadyrest is then moved to the required position and locked. It is usually located about 18 to 24 inches behind the front steadyrest and pressure-head. The headstock and feed gears are set to the required speed and feed and, in the order given, the coolant pump and main drive motors are started, and the feed-lever engaged. As soon as cutting begins, and at regular intervals afterwards, samples of the chips are taken from a perforated screen of the collector box.

Periodic examinations of the chips serve as a guide to the condition and performance of the cutting tool, in conjunction with the readings of the ammeter in the main-drive motor circuit. When boring is proceeding correctly, the variations shown by the meter should not exceed 4

amperes. Should any sudden rise occur, the feedlever is immediately disengaged and the machine and coolant pump are stopped so that the bar can be withdrawn for the examination and, if necessary, replacement of the cutter. On completion of the bore, the tool is removed through the lantern fixture before the bar is withdrawn.

A typical performance for this particular operation follows. The forging was trepanbored to a diameter of 3.010 inches, and the diameter of the core-bar removed was 1.593 inches. With the work rotating at 700 R.P.M.—which gave a maximum peripheral speed of 570 feet per minute—a feed of 0.007 inch per revolution was employed. The full 23 1/2-foot length of the bore was completed in fifty-four minutes, representing a penetration rate of 26 feet per hour, and the condition of the tool upon completion of the bore was found to be excellent. The finish of both the bore and the core were smooth and bright, with the core showing only a few feed scratches.

Throughout cutting, the drive motor circuit showed a steady load of 64 amperes, and the chips produced were small and consistent from start to finish. Subsequently, after the cutting edges had been relapped, the cutting tool was used on other similar forgings, the total length bored being 52 feet 2 inches. During the machining of the forging to which the foregoing figures apply, checks were made to determine the temperature rise of the coolant. At the start of the operations, the temperature was 81 degrees F., and on completion, 117 degrees F.—a temperature rise of only 36 degrees F.

The total time of fifty-four minutes is a normal production time for the work-piece de-

Table 1. Typical Results Obtained in High-Speed Trepan-Boring with Carbide-Tipped Tools

Example	Material	Diameter of Bore, Inches	Length Trepan- Bored, Feet	Machining Time, Minutes	Approximate Speed, Revolutions per Minute	Approximate Feed, Inch per Revolution	Rate of Penetration, Feet per Hour	Approximate Cutting Speed, Feet per Minute	Remarks
A	Nickel-chromium- molybdenum steel	3	23 1/2	54	700	0.0070	26	550	Normal operation
В	Nickel-chromium- molybdenum steel	3	23 1/2	34	850	0.0098	41 1/2	670	
C	Nickel-chromium- molybdenum steel	3	6 1/2	9	850	0.0102	43 1/2	670	
D	Steel, 0.4 per cent carbon	4	12 1/2	36	550	0.0075	20 3/4	570	Normal operation
E	Nickel-chromium- molybdenum steel	2 1/2	23 1/2	42	850	0.0080	33 1/2	550	Normal operation
F	Steel, 0.4 per cent carbon	2 1/2	30 1/2	57	850	0.0075	32	550	Bored from

Note: All of the above operations, with the exception of Example F, were carried out with one continuous cut for the total length of the work-piece. When comparing rates of penetration per hour for each size of hole, consideration should be given to the length bored at one continuous cut.

Table 2. Grades of Tungsten Carbide Employed for High-Speed Trepan-Boring Tools

Ap	proximate Analysis, Per	Cent	Specific Gravity,	771
Tungsten Carbide	Titanium Carbide	Cobalt	Grams per Cubic Centimeter	Vickers Hardness
79	15	6	11.25	1730
78 77 to 78	15 16.5 to 17.0	5.5 to 6.0	11.20 11.20	1670 1530 to 1580
77	16	7	11.30	1519 to 1525
80.5	12.5	7	11.50	1620

scribed, but can sometimes be improved upon. The operation was, on two occasions, completed in a cutting time of thirty-four minutes. For convenience of reference and comparison, the particulars of these and other boring operations are given in Table 1. The gun-barrel forgings completed in the periods of time mentioned are identified by the reference symbols A and B.

The greatest length accommodated by the lathe for boring at one continuous cut is 23 1/2 feet. Greater lengths—up to 31 feet—can, however, be bored by working first from one end and then from the other, the two cuts meeting in the middle, or at some other point if required.

The carbide tools employed for high-speed trepan-boring are of a type in which the cutting edge is divided into three approximately equal widths, with the central portion normal to the longitudinal axis of the shank (as mentioned in the first installment of this article). The central portion projects forward beyond the side portions by an amount approximately equal to the width of the chip-breaker groove, while the edges of the side portions are inclined toward the rear. Dimensional details of the tools cannot be tabulated, as the various rakes and

angles differ considerably according to the diameter trepanned, the work material, and other variable factors. Fig. 10, however, indicates the general proportions of one specific size. The holder to which the tungstencarbide tip is brazed is of rectangular section, with the rear portion finish-machined to form a cylindrical shank, and is of 0.60 per cent carbon steel in the normalized condition.

The seating and abutment surfaces on the holder for the carbide tip are surface ground, while the remainder is rough-machined with an allowance of 0.010 inch for final

grinding and fitting to the trepanning head. The tip is surface ground on one face and one end to insure correct seating in the corresponding recess of the holder. Several well-known methods of heating and brazing the tips have been tried, but the most satisfactory results have been obtained in the following manner.

Thin asbestos string is wrapped around the shank of the holder to prevent scaling and damage, and flux is applied to the seating surface. A piece of bronze strip, 0.010 inch thick, previously bent to a right angle to fit the seating and abutment surfaces, is next laid in position, and more flux is applied. The tungsten-carbide tip is then placed over the brazing foil in the correct relative position, and the whole is transferred to the preheating chamber of a gas-fired furnace. During the transfer, care is taken to insure that the positions of the tip and foil are not disturbed. After a suitable period, the work is moved into the main chamber, which is heated to not more than 1688 degrees F. As soon as the brazing material melts, the work is removed, and slight pressure is applied to the tip to insure that it is firmly seated, after which the work is covered with charcoal and left to cool.

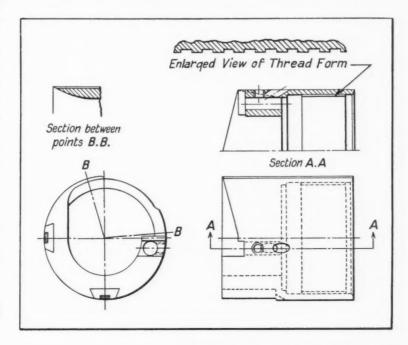


Fig. 11. General form of a typical high-speed trepan-boring head. Dimensions of the head will vary with operating conditions.

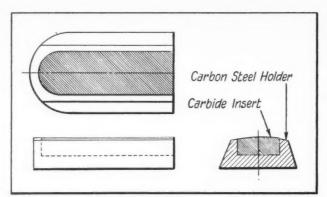


Fig. 12. Carbide guide piece, brazed into a dovetailed shoe, is fitted to trepanning head, as seen in Fig. 11.

The tools are made up in lots of not less than six, and each tool must be a tight fit in the trepanning head. During fitting, care is taken to insure that the sides, back, and end shoulder of the tool are firmly supported by the walls of the slot in the trepanning head. Tools made with tips sintered to shape have not proved satisfactory, and have shown a tendency to crack at the corners on each side of the central projecting portions. Tips cut from large pieces of carbide have given promising results, but the use of plain rectangular sintered pieces of suitable size is preferred. In experiments to determine the most suitable grades of carbide for use under production conditions, the types indicated in Table 2 have been found to have comparable life and performance.

After they have been fitted to the trepanning head, the tools are removed for grinding. Each tool is first ground on the top face to the required height. It is afterward replaced in the head, and the peripheral face is ground to an over-all diameter equal to that of the required bore. Subsequent grinding to width on the inner face, and grinding the front cutting faces, the

chip-breaker grooves, and the inner and outer relief faces are carried out in the order mentioned, with the work held at the appropriate angles in a universal vise. Light cuts are taken to avoid the formation of cracks in the carbide tips, and to minimize wheel wear.

ing

tai

chi

of

are

me

ov

the

Ea

an

tic

siz

th

Th

ar

The general form of a typical trepanning head is shown in Fig. 11. Here again, dimensions have been omitted because the exact shape will vary according to operating conditions. Alloy steel is used in the normalized condition.

There are two guide pieces of the general form shown in Fig. 12, and one of these (the sizing guide) is located diametrically opposite to the tool so that it is at the bottom of the head when the latter is set up for boring, while the second (the pressure guide) is disposed at 90 degrees, as seen in Fig. 11. Each guide piece consists of a 0.60 per cent carbon-steel holder and a tungsten-carbide insert brazed in position. The holders are made a driving fit in the trepanning head, and the outside surfaces of the guides are finally ground in position to a diameter 0.008 inch less than the outside diameter over the cutting tool. It will be observed that the leading edge of the holder is relieved slightly, whereas at the trailing edge the full diameter is maintained to afford maximum support for the insert.

Although trepanning tools of the type described will produce bores which are reasonably true and have a smooth finish, the operation must generally be classed as rough-boring. The standard heads are therefore designed to cut slightly smaller than the final bore size, so that a light finishing cut can later be taken. Where the initial bore standard of accuracy and finish is acceptable—for example in the preliminary piercing of gun barrels—the tools are, of course, ground to cut to the full size required. Bearing in mind the considerable torques imposed on the tubular boring-bars, and the necessity for keep-

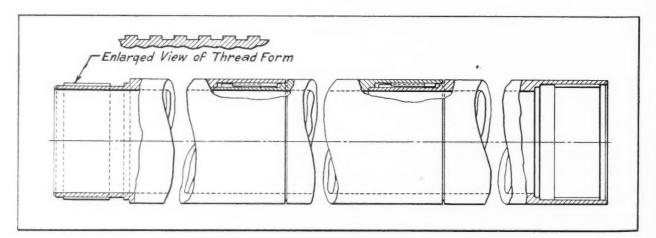


Fig. 13. Boring-bar assembly used in trepanning is made up of tubular sections screwed together for convenience of handling and for adjustment to suit various bore depths.

ing the wall thickness small in order to maintain reasonable clearances for coolant flow and chip removal, it is evident that the bars must be of a high-strength material. Accordingly they are made from alloy steel.

1

For convenience of handling and for adjustment to suit various bore depths, the bars are divided into sections, each 11 feet 1 inch long over-all, which are screwed together to build up the required lengths as indicated in Fig. 13. Each section has an internal thread at one end, and an external thread at the other. These sections are centerless ground externally to within \pm 0.001 inch. A trepanning head in any given size range may be assembled to the externally threaded portion of any bar section of the set. The threads, both in the heads and in the bars, are of shallow rectangular section in order that

Table 3. Dimensions of Alloy-Steel Boring-Bars for High-Speed Trepanning

Finished Diameter of Bore, Inches	Rough Diameter of Bore, Inches	Diameter of Core-Bar, Inches	Outside Diameter of Boring-Bar, Inches	Inside Diameter of Boring-Bar, Inches
2 1/2	2.441	1.024	2.283	1.811
3	2.992	1.575	2.835	2.362
3 1/2	3.465	2.047	3.268	2.599
4	3.858	2.441	3.780	3.110
4 1/2	4.409	2.677	4.331	3.425
5	4.843	3.110	4.750	3.844
5 1/2	5.394	3.661	5.313	4.406
6	5.827	4.095	5.750	4.844

they may be of reasonably coarse pitch without the need for an excessive tube wall thickness.

High-speed trepan-boring bars employed by Walter Somers, Ltd., are made from tubes in three alloy steels. One of these three steels has the following composition, in percentages: carbon, 0.20 to 0.35; manganese, 0.65 (maximum); silicon, 0.35 (maximum); sulphur, 0.04 (maximum); phosphorus, 0.04 (maximum); nickel, 4.00 to 4.50; and chromium, 1.10 to 1.40. When correctly air-hardened and tempered, this material has a minimum yield strength of 156,000 pounds per square inch, an ultimate tensile strength of not less than 170,000 pounds per square inch, and a minimum elongation of 5 per cent in 2 inches. In Table 3 are given dimensions of the complete range of boring-bars employed for various bore diameters from 2 1/2 to 6 inches. The corresponding core-bar dimensions are also indicated.

In the selection of a suitable cutting oil for high-speed trepan-boring, consideration must be given to the threefold purpose which it has to fulfill. It must be readily capable of absorbing and dissipating the heat generated at the cut-

Table 4. Increase in Coolant Temperature During Trepan-Boring

Gun Barrel Number Temperature of Oil at Start of Cut, Degrees F.		Temperature of Oil at Finish of Cut, Degrees F.
1	48	104
2	81	117
3	86	120
4	91	122

ting tool; it must be an efficient lubricant; and at the same time it must serve as a vehicle for carrying the chips away from the working zone and back through the considerable length of the boring-bar. For these reasons, such characteristics as viscosity, stability with changes in temperature, and non-frothing and nonaerating properties are critical. The coolant employed is a pale, transparent cutting oil of the sulphurized type, possessing anti-weld properties. The oil has the following specifications: specific gravity, 0.886; open flash point, 290 degrees F.; pour point, 10 degrees F.; viscosity, Saybolt, at 100 degrees F., 55 to 65 seconds and at 130 degrees F., 46 seconds; active sulphur, 0.2 per cent; and other additives, 1.8 per cent.

Although the maximum operating temperature of this oil is 200 degrees F., it is recommended that the temperature should not be allowed to exceed 160 degrees F., since otherwise discomfort would be felt by the operators. The amount of heat generated during high-speed trepan-boring is less than that resulting from other methods, and for this reason, oil coolers are unnecessary. This fact is borne out by the figures given in Table 4, which are the result of checks made during the trepanboring, in one shift, of four 3.7-inch gun barrels. The operating conditions were similar to those described earlier, in which bores 23 1/2 feet long and 3 inches in diameter were trepan-bored in an average time of fifty-four minutes each. It will be seen from the table that the maximum temperature attained was 122 degrees F.

These figures were obtained with the original coolant pump, which circulated the full 350 gallons capacity of the tank at the rate of 67 gallons per minute. The larger pump, which was installed later, has a maximum capacity of 140 gallons per minute, and is adequate for use when holes up to 6 inches in diameter are being bored. The oil pressure attained depends on the restriction of the flow, and therefore varies according to the bore depth. Thus, at the start of a 2 1/2-inch diameter bore, the pressure attained is usually from 50 to 70 pounds per square inch, rising to 160 pounds per square inch at a pene-

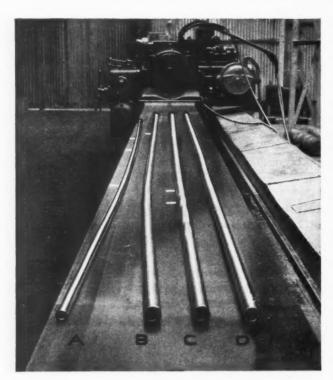


Fig. 14. Four examples of core-bar distortion in highspeed trepan-boring. Distortion in core-bars (A), (B), and (C) was sufficient to cause tool failure, which occurred at points indicated by chalk marks.

tration of 21 feet. On a 3-inch diameter bore, the starting pressure is 50 to 60 pounds per square inch, rising to 150 pounds per square inch at a penetration of 23 feet. The two magnetic filters installed on the suction side of the coolant pump are cleaned after every 200 feet of length bored, for sizes up to 4 inches in diameter.

During the earlier experiments in high-speed trepan-boring, tool breakages were frequent, and were due mainly to the use of unsuitable grades of carbide, hairline cracks in the carbide, faulty brazing, loose fitting of the holder in the trepanning head, wear affecting the shape of the cutting edges and so setting up vibration, or a combination of these causes. It became evident that, even when a suitable grade of carbide was employed, extreme care was necessary in the preparation of the tools. Similarly, a strict control of all aspects of the processes, as here described, must be maintained. Accordingly, the firm decided to undertake the preparation of the carbide-tipped tools themselves. Since that time, tool failures have been considerably reduced, and on satisfactory gun barrel forgings are practically unknown.

When cutting is proceeding correctly, there should be a complete absence of vibration, and the core-bar should remain straight throughout its length. When this condition is obtained, the rotating core-bar rests evenly on the inside of the tubular boring-bar without affecting it. If,

on the other hand, the interior of the work is in a stressed state because of incorrect heat-treatment, the release of internal stresses gives rise to distortions of the core-bar. Should the corebar become distorted in this manner, it rotates eccentrically inside the boring-bar and, if the distortion is extreme, presses against it. This rotational pressure, in turn, imparts to the boring-bar a winding motion which is transmitted to the boring head. Vibrations and heavy loadings on the tool are set up, which then cause failure. Bores and cores in which this type of defect have occurred are irregularly shaped and usually exhibit a characteristic helical distortion. This condition is one of the most frequently encountered causes of tool failure.

Four examples of core-bars showing varying degrees of distortion are seen in Fig. 14. Difficulty was experienced in the boring operations because of the excessive vibrations set up in the boring-bar and head. Tool failures occurred on the three specimens A, B, and C, and the points of failure are indicated by the white chalk marks at the left-hand side of each. As will be seen from the illustration, there were three tool failures on A, one on B, and two on C. The bore D was completed without tool breakage. This core, however, although only slightly wavy, gave rise to movements of the boring-bar sufficiently severe to cause the head to run off center. The misalignment, in turn, gave rise to an eccentricity of 3/16 inch at the far end of the completed bore.

When the forging corresponding to B was being bored, the tool failed after having penetrated a distance of 17 feet 7 inches. The boring-bar was withdrawn, and it was found that the end of the core-bar then pressed heavily against the open end of the work at a position corresponding to three o'clock. When the work was slowly rotated by hand, through 180 degrees, the



Fig. 15. Progressive fracture of a carbide-tipped trepanning tool is indicated by a predominance of ribbon-like chips of increasing width.

end of the core-bar was observed to float across the center of the bore to the nine o'clock position. A further rotation through 180 degrees, however, did not cause any further movement of the core-bar, which remained firmly in contact with the same point on the bore. A new tool was substituted in the head, and the remaining length of 4 feet 11 inches was satisfactorily completed.

t-

se

e-

es

1e

is

r-

ed

d-

se

of

d

n.

ly

i-

ıs

ıe

n

ts

S

n

lo

·e

is

e

y

e

-

e

t

S

e

When forging C was being bored, violent movements of the core occurred after a distance of approximately $3\ 1/2$ feet had been penetrated, the vibrations causing the tool to fail at a depth of 6 feet 1 inch. Another tool was fitted, but movement and vibration continued and another failure occurred after a further distance of 13 inches had been bored. The bore was finally completed by fitting a third tool, but was 1/16 inch eccentric at the finish. The characteristic helical deformations and markings may be seen on this core-bar.

Another cause of tool failure is excessive wear of the carbide tip. The condition of the tool is ascertained by periodic examination of the chips, in conjunction with readings of the ammeter in the drive-motor circuit. If the appearance of the chips changes appreciably because of wear or breakage, the machine should be stopped and the tool replaced. Frequently, it can be reground for further use. On occasion a complete collapse of the tool takes place, and is indicated by a sudden increase in the reading of the ammeter. Should this occur, the feed must be instantly disengaged and the machine stopped.

A typical "history" of such a failure was recorded in connection with the boring of a gun-barrel forging. The bore diameter was 3 inches, and after a depth of 17 feet had been reached, the chips, instead of being small and uniform, included several long wire-like pieces.

This indicated that a corner of the cutting tool had broken or worn away. Boring was continued, and the appearance of the chips had changed to that shown in Fig. 15, from which it was noted that wire-like chips had diminished, whereas ribbon-like strips had become more numerous. This change indicated further fracturing of the corner, and progressive deterioration was revealed by measuring the width of the strips, which changed from 1/8 to 3/16 inch during the next 6 inches of depth bored. The ammeter then showed a sharp rise in power consumption, and the feed was immediately interrupted and the machine stopped.

When the bar was withdrawn, it was apparent that the ribbon-like chips had failed to clear and had caused an obstruction to chip flow. The chips had built up on the tool in the manner shown in Fig. 16, and had been compressed into a solid mass 1 inch high. Another possible source of tool failure is insufficient width of chip-breaker grooves. On subsequent trepanning tools, when the width of the chip-breaker grooves was increased, no similar trouble was experienced.

When tool failure involves fracture of the carbide tip, small fragments of carbide may become embedded in the end face of the bore. It is essential to remove these particles before trepanboring can be continued, and for this purpose flat-ended tools are employed. Such tools are tungsten-carbide tipped, and are, in general, similar to the trepanning tools except for the form of the cutting edge. In use, this type of tool is substituted for the standard tool and is hand fed against the end of the bore with the work rotating at approximately 240 R.P.M. Feed is then continued until broad, clean cuttings of the full width of the tool are produced, whereupon a standard tool may be substituted and boring resumed.

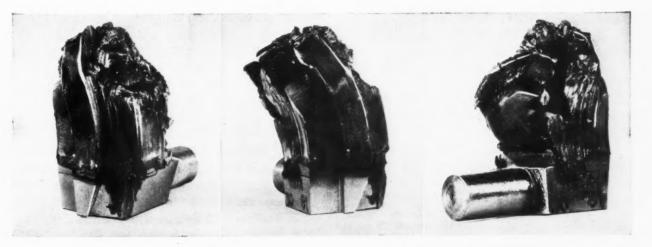


Fig. 16. Different views showing build-up of compacted chips on a carbide-tipped trepanning tool, which resulted from continued trepan-boring despits the warning served by the chips seen in Fig. 15

Materials OF INDUSTRY

The Properties and New Applications of Materials Used in the Mechanical Industries

Properties and Applications of a New Chromium Carbide

"Grade 608 Chrome Carbide," first of the new Series 600 cemented chromium carbides, has been made available by Carbolov Department of General Electric Co., Detroit 32, Mich. This metal has high resistance to both corrosion and erosion, and also good abrasion resistance. Made by the powder metallurgy process, it is light in weight, has a coefficient of thermal expansion approximately the same as steel, is non-magnetic, and has resistance to high-temperature oxidation.

The metal is composed of 83 per cent chromium carbide, 2 per cent tungsten carbide, and 15 per cent nickel. The accompanying table shows its density, which is about half that of tungsten carbide, and its coefficient of thermal expansion, which approximates that of steel. The carbide will be available in approximately the same size and shape range in which tungsten carbide is now being offered. Because costly and critical tungsten and cobalt are not constituents of Grade 608 Chrome Carbide, it is expected that complete parts can be economically made of solid

Physical Properties of Cemented Chromium Carbide (Grade 608)

Hardness	88 Rockwell A
Density	7.0 grams per cubic centi- meter (slightly lighter than SAE 1095)
Transverse Rupture	
Strength	100,000 pounds per square inch
Compressive Strength	Higher than most hard- ened steels
Coefficient of Thermal	
Expansion	6.4×10^{-6} in the range of 70 to 1292 degrees F.
Abrasion Resistance	Good—somewhat less than tungsten but much bet- ter than hardened steels
Resistance to Oxidation	Only a slight surface dis- coloration after twenty- four hours in air at 1800 degrees F.
Resistance of Corrosion	Excellent
Magnetic Permeability	Non-magnetic

chromium carbide in contrast to attaching individual pieces as has been done with tungsten carbide in the past.

Generally, the same methods used in fabricating tungsten carbide are used for Grade 608 Chrome Carbide. Components can be molded to shape for standard or quantity parts. They can also be economically machined to required shapes in the pre-sintered condition for small-lot production. Grinding, lapping, and polishing are performed with conventional silicon carbide grinding wheels, diamond grinding wheels, and diamond lapping compounds. Polished surfaces of chromium carbide have a more brilliant luster than those of tungsten carbide.

The material can be attached by brazing, by mechanical means, or by thermosetting resin cements. It is necessary to flash-plate chromiumcarbide parts with nickel for brazing with conventional materials. In general, resin-cemented joints can be used in place of brazed joints where high strengths are not required and when the application operates at room or slightly elevated temperatures.

This carbide is used in the gage manufacturing field where wear resistance of gaging surfaces and temperature effects of expansion are important considerations. The corrosion resistance of the chromium-carbide gaging surfaces is also a factor in prolonging gage surface life. The metal facilitates the making of instrument components that are non-magnetic and yet highly resistant to wear and corrosion.

Barrel Burnishing Compound Produces

Hand-Buffed Appearance

A barrel burnishing emulsion that produces a hand-buffed appearance on all metals and which may be used with any tumbling medium in standard barrel finishing equipment suitable for wet tumbling, has been developed by Blue Magic Chemical Specialties Co., 2135 Margaret St., Philadelphia 24, Pa. "Blue Magic No. 0-221,"

as it is called, mixes readily with water, has no objectionable odor, is not irritating to the skin, and may be used repeatedly. A water rinse removes it from the cutting medium or work.

Cleaner Available for Prepaint Treatment of Metals

Oakite Compound No. 31, a metal cleaner which cleans, derusts, and gives a phosphate coating in a single operation, has been announced by Oakite Products, Inc., 126 Rector St., New York 16, N. Y. This cleaner is a highly concentrated liquid detergent which can be diluted up to 25 per cent by volume for economical prepaint treatment of metal by dipping or handswabbing methods. Beside preparing metal for paint, it effectively removes light soils, soldering and welding fluxes, rust, heat scale, tarnish, and other oxides. The cleaner converts the surface layer of metal into a thin film of insoluble phosphates. The action on an aluminum sheet and aluminum castings is similar, with the adhesion of paint to metal being improved in all instances. The inert film deposited by this material also prevents the spread of rust when painted surfaces become scratched or gouged-rusting is confined to the exposed area of metal only.

Stick Type Wax Lubricant for Metal Cutting Tools

A wax lubricant of stick type for cutting tools, threaded metal fastenings, and other metallic forming tools used in production manufacturing and tool-rooms has been made available to industry by the DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. This product, called "Tool-Saver," is a mixture of wax ingredients which was designed to reduce the friction and the heat accompanying machining operations. It helps prevent detrimental abrading, scoring, or burning of a tool or the work, and noticeably improves surface finish on the machined material. In many cases, burrs resulting from machining are eliminated.

The stick is supplied in a handy 1-pound "push-out" cardboard dispenser tube, and is applied directly to the cutting edges of the tool or to the surface of the material that is to be machined. It is recommended for use on such tools as saw bands, knife bands, circular saws, hacksaws, twist drills, taps, reamers, countersinks, spinning tools, grinding wheels, sanding belts or wheels, routing tools, etc. When used in certain grinding or sanding operations, it prevents burning and promotes good finish.

Non-Clogging Abrasive Cloth Facilitates Metal Removal

"Gritcloth" is a tough, open-mesh fabric with embedded abrasive, which permits removed stock to flow through the openings. It may be used wet, dry, flat, or folded on sanding machines, and by hand. The cloth is easily cleaned by rinsing in water. It will remove metal, wood, etc., in roughing or smoothing operations. "Gritcloth" has been made available to industry by the Bay State Abrasive Products Co., Westboro, Mass.

Two New Lead-Bearing Steels Exhibit Good Machinability

Two new lead-bearing steels have been placed on the market by LaSalle Steel Company, 1412 150th St., Hammond, Ind. "Super La-Led"—one of the steels—is a free-machining open-hearth steel containing about 0.25 per cent lead and nearly 0.50 per cent sulphur. It is said to have the highest sulphur content of any steel produced commercially in this country. The steel may be used instead of brass in some applications where corrosion is not a factor. It is recommended for applications where full advantage can be taken of its machinability.

The second steel, called "Leaded TS 4140 Modified," is a lead-bearing alloy. This steel will machine one-third faster than the comparable non-leaded grade. Experience indicates that its heat-treating characteristics, hardenability, and mechanical properties are not appreciably affected by the addition of the lead. Both new steels are available cold-drawn in various size ranges in rounds and hexagons.

Rust-Inhibitive Primer for Non-Prepared Surfaces

A vinyl primer, Tygorust, developed for use on rusted steel surfaces without any prior preparation has been announced by the U. S. Stoneware Co., Akron, Ohio. The primer is applied by brushing, spraying, or dipping; dries hard; and can be overcoated in a matter of minutes. It adheres to rusted steel, damp or dry, and can be used with any type of finish coating—particularly vinyl resins.

Dry, rusted steel has been successfully primed without wire-brushing. For maximum results the surface must be free from grease and oil, and loose scale. Applicable to old, oxidized paint films (bituminous coatings excepted) without lifting or bleeding, it can be safely coated with vinyl, nitrocellulose, alkyd, and oil-based finishes.

Making Large Plain Sleeve

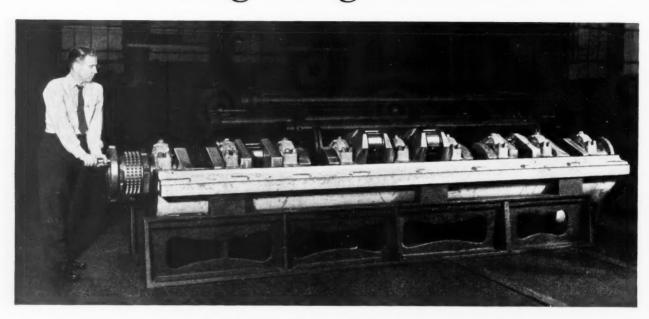


Fig. 1. This Diesel engine crankshaft installed in an engine base with precision plain sleeve bearings is easily rotated by hand.

PRECISION bearing shells have been used for many years by the automotive industry because they can be replaced without completely dismantling engines. Also, they require no hand fitting or scraping which may result in improper bearing clearance. Another advantage is that it is not necessary to run an engine at low speed for a specified length of time to "wear in the bearings." An engine equipped with precision shells, therefore, can be operated at full load immediately.

Before the Cooper-Bessemer Corporation of

Mount Vernon, Ohio, adopted precision bearings for its Diesel and gas engines, thick babbitt bearings were used, and they had to be scraped and fitted at assembly to obtain the proper running clearances. A Diesel engine crankshaft is shown in Fig. 1 installed in an engine base with precision bearings. There was no scraping or fitting of the bearings during the assembly of this unit. The shaft can be rotated by hand, thus illustrating the ease with which a heavy shaft can be turned when its bearings are in alignment and have the proper clearances.

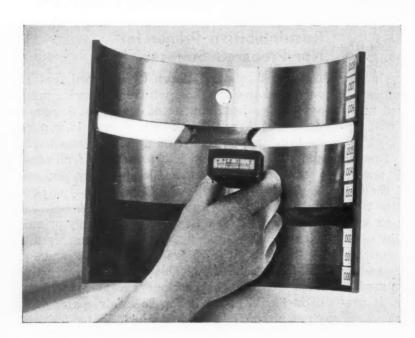


Fig. 2. To check the concentricity of babbitt thickness in bearings, one of the bearings is occasionally bored in progressive steps varying 0.001 inch in height.

Bearings to Close Tolerances

Large Plain Sleeve Bearings for Gas and Diesel Engines are Made to a High Degree of Accuracy in Relatively Small Quantities. This Article Describes Some of the Tools and Most Important Steps Required to Manufacture These Bearings Economically and Accurately

By E. C. PHELPS
Assistant Works Manager, Mount Vernon, Ohio, Plant
Cooper-Bessemer Corporation

For many years it has been known that heavy babbitt bearings do not have as long a service life as thin babbitt bearings. The shorter life of heavy babbitt bearings is due to the low fatigue strength of babbitt metal. Because of this, the concern endeavored to perfect techniques whereby large bearings could be produced economically in small quantities with a babbitt thickness of 0.007 inch maintained within plus or minus 0.001 inch throughout the bearing.

A precision sleeve bearing bored on a Heald Bore-Matic with the tool set out in progressive steps of 0.001 inch is shown in Fig. 2. A cut is taken for a substantial width with each tool setting, as indicated in the illustration. This is a test that provides a check on the concentricity of babbitt thickness for the entire length of the bearing surface, the test being run only occasionally. Each bearing, however, is checked with the magnetic meter shown in this illustration. This meter does not damage the bearing, and yet gives accurate babbitt thickness readings. The largest precision bearing made at the

plant has a babbitt bore 15 inches in diameter, while the smallest bearing has a bore 5 inches in diameter.

Manufacturing precision bearings in small lot sizes requires very accurate fixtures which are adapted to standard machine tools. The procedures described in this article are those employed to produce bearings with a 9 1/2-inch diameter bore and a wall thickness of 0.277 inch within plus or minus 0.0005 inch. Limits on the concentricity between the inside and outside diameters are held to 0.0005 inch, and the babbitt thickness must be held to 0.007 inch, within plus or minus 0.001 inch. The wall of this bearing is made of processed cast iron.

One of the first operations consists of machining this casting, holding close tolerances in the bore and leaving an allowance for grinding stock on the outer periphery. The outside diameter is ground with the work on the fixture shown in Fig. 3, the diameter being held to size within 0.001 inch.

The bearing is then assembled into the pot

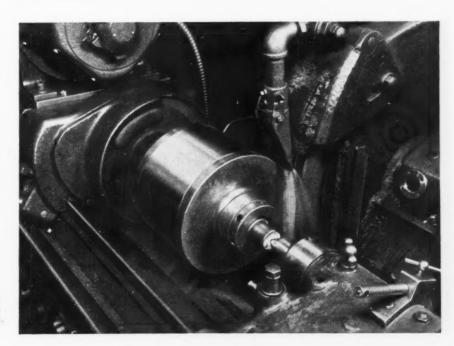


Fig. 3. The outer periphery of castiron bearing shells is ground within a tolerance of 0.001 inch on the fixture here illustrated.

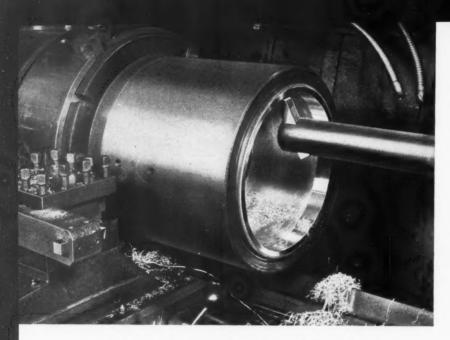


Fig. 4. Before applying babbitt, bearing shells are bored in pot fixtures such as this, maintaining a high degree of concentricity between the inside and outside diameters.

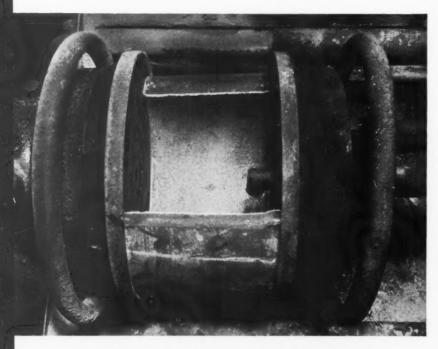
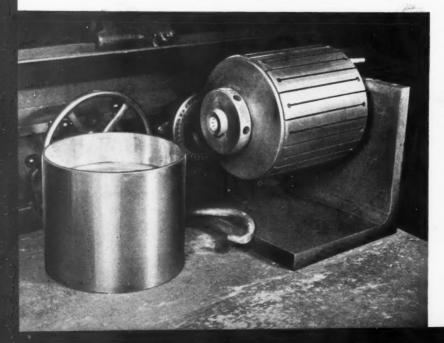


Fig. 5. Babbitt is spun into bearing shells in special lathes after treating the bearings by the Kolene process.



fixture shown in Fig. 4, and bored to close tolerances before babbitting. This operation makes the outside and inside diameters concentric within the tolerances mentioned above. Bearings are then treated by the Kolene process, which makes it possible to obtain a well tinned surface, thereby assuring a good bond between the babbitt and the backing material. The next step—spinning babbitt into the bearing—is performed on the spinning lathe seen in Fig. 5.

To test the strength of bond between the babbitt and the backing material, two cast-iron blocks are treated by the Kolene process, after which they are tinned. They are next placed in a fixture and babbitt cast between them, the piece then being machined into the shape of a test bar. A tensile test is made, and the amount of pull required to separate the pieces is recorded. A tension of 8700 to 10,500 pounds per square inch is consistently required to separate the pieces.

After the spinning operation, the bearing is returned to the pot fixture, Fig. 4, and bored to size within 0.001 inch. Since the bearing is bored in this fixture before and after babbitting, the babbitt thickness is uniform and the bore is concentric with the outside diameter. After boring, the bearing is ground on the expansion mandrel seen in Fig. 6. This type of mandrel insures the concentricity of the outside diameter with the bore, thus making the bearing wall uniform in thickness. The bearing is next placed in a sawing fixture, as shown in Fig. 7, and cut in half.

In order to obtain satisfactory service from a bearing shell, it must be held rigidly in the supporting member. To accomplish this, the bearings are milled at the joint to a height of a few thousandths inch more than the center line of the bearing. Thus, when the two halves are clamped with the cap, the bearing is forced to conform to the supporting wall. The milling fixture in which this work is done is illustrated in Fig. 8, where it can be seen that the clamping shoe is lined with rubber. The

Fig. 6. To maintain uniform wall thicknesses, the bearings are placed on an expanding mandrel for grinding the outside diameter after the boring operation has been performed.

rubber distributes the load uniformly to the total surface of the bore, forcing the outside diameter to hug the fixture. After each bearing is milled, it is checked in a height fixture, seen in Fig. 9. As the shell is placed in the checking fixture it is clamped with a force measured by a torque reading to assure uniform loading on each bearing checked. Dial indicators on a movable arm that swings into position over hardened buttons are set at zero. When the arm is swung into position over the joint, the height of this joint above center is shown in thousandths of an inch on the indicator dial.

to nis

de

erre

ss, ell

od k-

ng

ed

en

al, ne

re

xne

ne

is

be

Aer

e, 1 is e e e is n s - e e

e

dodd

Oil slots are cut in the shell for lubricating oil to pass from the back supporting member through to the bore. This is done in the slotting fixture seen in Fig. 10. Here the bearing is clamped on a rotary table, the end-mill put through the shell, and the bearing rotated within the indicated slot markings. The next

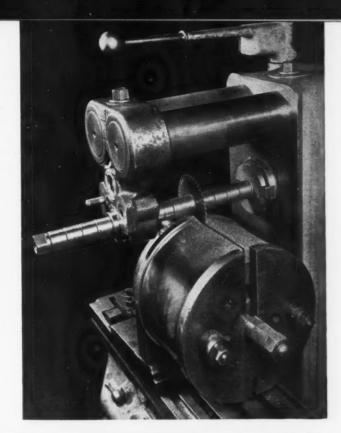


Fig. 7. (Top) Bearings are cut in half in horizontal milling machines after boring and grinding the outside diameter.

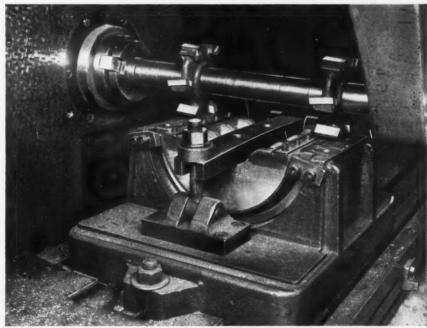


Fig. 8. (Center) The joint of a bearing is milled a few thousandths inch above the center so that when two halves are assembled the bearing is forced to conform to the supporting wall.

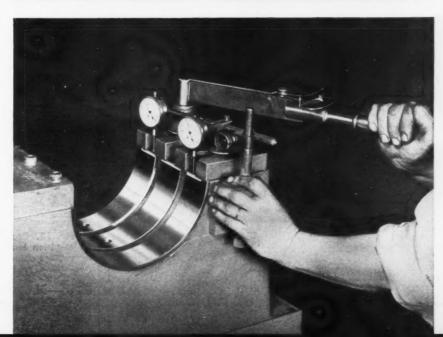


Fig. 9. The bearings are clamped in an inspection fixture with a force measured by a torque reading to insure uniform load on the bearing.

August, 1952—177

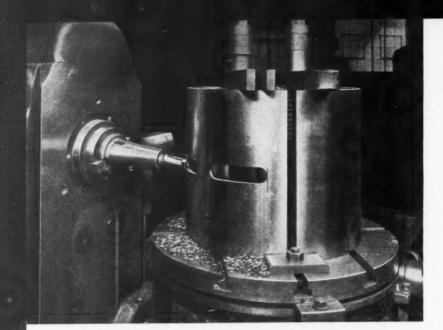
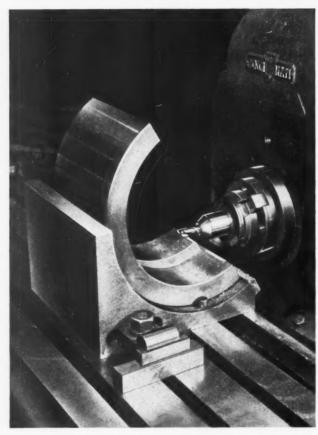


Fig. 10. A horizontal milling machine is employed for cutting oil slots in a bearing shell.



operation is to cut the oil-wedge chamfers at the joints. This is done by feeding the machine table, with the shell in the milling fixture shown in Fig. 11, past an end-mill used to cut the chamfer. The bearings are then drilled and reamed for dowel pins.

After all machining burrs are removed, the bearings are precision bored in the fixture seen in Fig. 12. The shells are placed in the fixture, and the clamping force is applied and measured with a torque wrench. In this way, the bearing wall is held securely against the fixture so that the wall thickness will be uniform after boring. During this operation, air is blown through the bore to remove the chips, thus preventing a chip from being carried around by the tool and marring the finished surface. When all operations are completed, a final inspection is given the bearings in which they are checked for wall thickness, concentricity, babbitt thickness, and quality of finish.

Fig. 11. Oil-wedge chamfers are milled in the bearing joints by employing an end-mill and the semicircular milling fixture here illustrated.

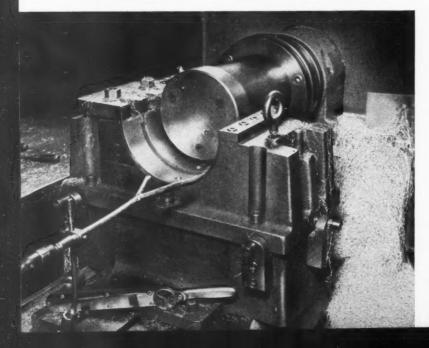


Fig. 12. Bearings are assembled in this fixture for precision boring. During the operation, air blasts remove chips to prevent marring finished surface.



Mollerizing Iron and Steel **Provides Aluminum Surfaces**

the surfaces of steel or iron parts, re-A gardless of intricate shapes, by the various types of corrosion. Mollerizing process which is being applied in the plant of the American Mollerizing Corporamersing the work-pieces to be treated in an

LUMINUM can be united permanently with tion, Beverly Hills, Calif. The process provides a means of fully protecting work-pieces from

The Mollerizing process consists briefly of im-

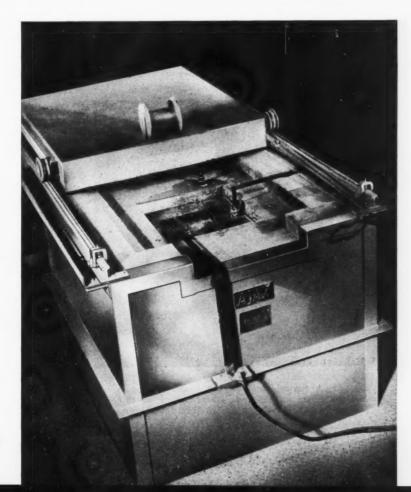


Fig. 1. General view of the electric furnace in which steel or iron work-pieces are Mollerized.

MACHINERY, August, 1952-179

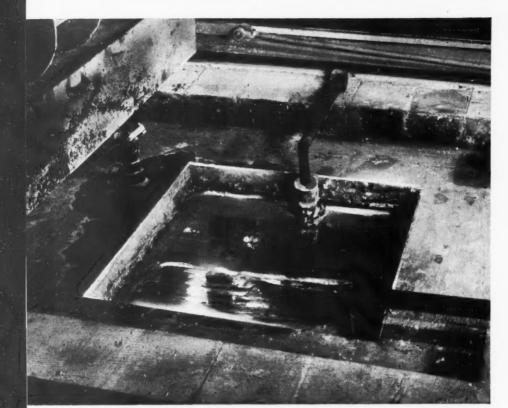


Fig. 2. Molten aluminum to a depth of 2 to 4 inches floats on top of the salt bath for coating work-pieces to protect them from corrosion.

electrically heated salt bath furnace after the parts have been thoroughly cleaned and pickled. The bath has a layer of molten aluminum on top from 2 to 4 inches in depth, depending upon the particular work being performed. When the parts have reached the temperature of the bath, which is approximately 1500 degrees F., they are held at that temperature for a short period of time, for pickling purposes. They are then withdrawn through the molten aluminum on top of the bath and consequently receive a coating of aluminum on all exposed surfaces.

In the heading illustration, an aluminum ingot suspended from a hoist is about to be transferred to the salt bath in which the ingot will be melted. The molten metal will float on the salt bath due to the lighter weight of the aluminum. This ingot weighed approximately 50 pounds.

The salt bath consists primarily of barium chloride. A positive direct-current electrode is submerged in the molten aluminum. The conduit which leads to this electrode is seen at the back of the salt bath in Fig. 2. In the lower right-hand corner of the same illustration is seen a

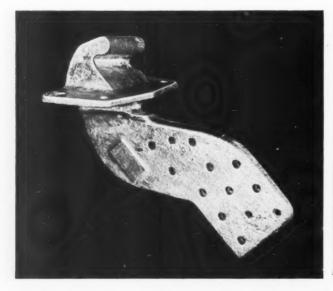


Fig. 3. A typical steel forging which has been Mollerized on all external surfaces and in the holes to make it suitable for aircraft application.



Fig. 4. Two flash-welded aircraft landing-gear struts are here shown—the bottom strut has been Mollerized, while the top strut is untreated.



ie n-

is





Fig. 5. (Left) Concave side of a kidney-shaped stamping made from a sheet of titanium after the sheet had been Mollerized with pure aluminum. Fig. 6. (Right) Convex side of the same stamping.

conduit which leads to a negative pole attached to the shroud in the furnace. The shroud becomes the cathode, while the molten aluminum and the work constitute the anode. The opening of the furnace measures 18 by 18 inches and the tank is 6 feet deep. The connection to a thermocouple is seen on the left-hand side of the furnace. The salt bath furnace is a standard type built by the Ajax Electric Co., and has an electrical capacity of 50 kilowatts.

In the coating operation, a layer of aluminum approximately 0.005 inch thick is customarily deposited on the work. A typical forging for an aircraft application is shown in Fig. 3. This forging has an over-all length of 7 1/2 inches. In Fig. 4, an untreated landing-gear strut is shown at the top, and at the bottom a second strut with the eye end Mollerized.

A sheet of titanium, which was Mollerized with pure aluminum and then pressed into a kidney-shaped form by one of the aircraft companies, is illustrated in Figs. 5 and 6. The concave side of the stamping is shown in Fig. 5 and the convex side in Fig. 6. Because the soft aluminum coating acted as a lubricant in the stamping operation, no cracks or scaling occurred. The temperature of 1500 degrees F. annealed the metal and, therefore, made it much easier to form than would have been the case

had the titanium sheet not been Mollerized. The work-piece hardened as a result of the die action.

After a part has been coated, it is washed in hot water to remove any possible trace of salt, and then rinsed thoroughly in cold water. Mollerized work-pieces can be oxidized with a chemical solution, if desired, or anodized in the same way as a solid piece of aluminum alloy. Due to the aluminum coating, neither surface cracks nor scaling occurs, and it is unnecessary to apply an additional protective coating to prevent the steel from rusting.

In addition to the advantages of the Mollerizing process already mentioned, with this method of coating the work is not exposed to the air between the time that it is heated and coated. This avoids any contamination which might occur from exposure to the atmosphere.

The average annual world production of the noble metals, valued at over a billion dollars, is approximately 6500 tons of silver, 1000 tons of gold, and only 20 tons of the platinum group of metals. These 20 tons comprise about 60 per cent platinum, 30 per cent palladium, 4 per cent rhodium, 3 per cent ruthenium, 2 per cent iridium, and 1 per cent osmium.

In Shops Around the



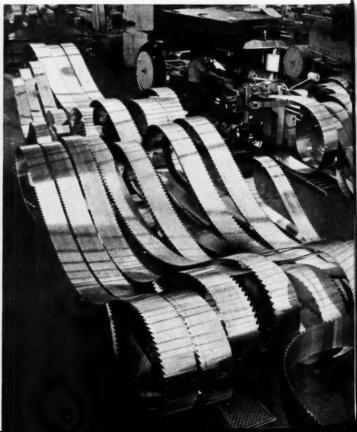
Camera Highlights of Some Interesting Operations Performed in Various Metal-Working Plants throughout the Nation

A standard Gorton vertical milling machine has been converted to die-sinking applications by means of a Turchan follower attachment to produce irregular cavity shapes required in a forging die. A tracer and template control the cut.

Accurate control of grain size in brass strip is obtained at the Chase Brass & Copper Co. with this bell type annealing furnace. The inner steel hood is shown being lowered over coils. The gas-fired heating furnace (background) is then lowered over the assembly.

These completed 50-foot endless band-saw blades, shown awaiting shipment from the Simonds Saw & Steel Co., were joined together with specially made filler rods. General Electric atomic-hydrogen equipment was employed for the welding operations.





Country

Silver tubing for thermo-couple shields, used on measuring devices to record engine temperatures during actual operation of aircraft, is finished to precision tolerances on a Levin watchmaker's lathe by the AiResearch Mfg. Co.







Both wall thickness and depth of copper rotating bands for artillery projectiles are inspected on this special two-way dial indicating gage, which was designed by quality control engineers at Chase Brass & Copper Co.

Rapid machining of aircraft jet-engine parts has been facilitated by means of right-angle lathes. A Monarch 60-inch right-angle lathe is here illustrated being used to turn and bore, simultaneously, the wall of an impeller for an aircraft turbo-jet engine.

MACHINERY, August, 1952—183

Shell Mold

01 01 01

tl

Fig. 1. Both halves of a shell mold are being removed from the machine after a semi-automatic cycle of only two and one-half minutes.

HELL mold casting, in which molten metal is poured into thin plastic-bonded sand shells, is a revolutionary development in the foundry field. A thermosetting phenolic plastic binds the sand mixture together when it comes in contact with a heated pattern, and, after curing, the hardened shell mold is ready to receive the molten metal. Superior products having intricate contours and thin sections can be cast to closer tolerances and with improved surface finish. It has been reported that sand requirements have been reduced as much as 90 per cent, and, because of the precision maintained, subsequent machining of the castings has been reduced as much as 75 per cent. Also, the process is ideally adaptable to mechanization and the utilization of unskilled labor.

Widespread application of this new casting process, however, and the dissemination of technical information necessary for its use, have been hindered by a patent wrangle. The shell molding, Croning, or "C" process was invented by Johannes Croning in Germany during World War II. Although a patent was applied for in Germany during 1944, it was not granted, and fundamentals of the process were first described in this country in a Department of Commerce, Office of Technical Services Report—"F.I.A.T. Final Report No. 1168"—dated May 30, 1947. It is the opinion of many industrialists that the process belongs to the United States Government and can be used freely by industry.

However, Crown Casting Associates, Boston,

Mass.—to whom Croning assigned rights when he filed application with the U. S. Patent Office in 1947—claim that improvements developed by Croning since the war are patentable and essential to successful shell molding.

Because of this situation, few of the many foundries using the process are willing to publicize the fact. One break in this wall of silence was a recent public demonstration of shell mold casting of stainless steel at the Cooper Alloy Foundry Co., Hillside, N. J.

Actual research in the casting of stainless steel by the shell mold method began at Cooper Alloy in August, 1950. Since little detailed information was contained in the U.S. Government Report, many problems were encountered in the early stages of the research program. For example, patterns were made from several materials before an aluminum alloy was decided upon. Also, many mold release agents were tried before silicones were adopted. Development of heading and gating methods was quite a problem, since they differ considerably from those employed in ordinary sand molds. Pouring temperatures, methods of sealing the mold halves, and mechanization of the process were additional problems that had to be solved.

In commercial production now being carried out at this foundry, the thin, single-use shell molds are made on a semi-automatic machine, Fig. 1, built by the Shell Mold Machine Co. After the aluminum pattern plate has been placed in the machine, it is preheated to a tem-

Casting of Stainless Steel

perature of 500 degrees F., and a dump box containing the sand-resin mixture is lowered on the pattern. Louvers in the dump box are opened to let the sand-resin mixture fall on the pattern. The pattern and box are rolled over as a unit, and excess mixture falls back into the box. Louvers in the box are then closed, and, when the unit returns to its normal position, the dump box is raised—leaving a soft shell mold on the pattern. Still in the machine, the shell mold is cured at a temperature of 500 degrees F. After the oven has been retracted, the hardened mold is automatically stripped from the pattern and manually removed from the machine.

A sand-resin mixture containing (by weight) 8 per cent phenol-formaldehyde resin, 5 per cent iron oxide, 1/4 per cent wetting agent, and the balance A.F.A. 160 mesh silica sand, is used for this operation. The heavy-duty machine is capable of turning out a complete mold every two and one-half minutes. The company can now complete 350 molds a day, compared with 75 sand molds previously turned out each day. The pattern must be kept clean, and coated with a silicone parting compound to facilitate separation of the sand-resin mold from the metal pattern. A surface pyrometer is used to check the pattern and mold temperatures.

Two shell mold halves are assembled into one hollow unit by means of adhesive strips placed between the mold halves, Fig. 2. Powdered resin applied on mating faces of the mold halves is an alternate method of sealing the mold. After pressing the mold halves together by hand, the unit is closed under pressure in a press, Fig. 3. A completed shell mold is shown in Fig. 4. The shell molds are stacked on a simple pouring rack which holds twelve molds, Fig. 5, and molten stainless steel at a temperature of 3100 degrees F. is poured into the molds from a hand ladle, as seen in Fig. 6. Pouring completed, the castings are left to solidify and cool for from five to seven minutes. The castings are then shaken out of the mold-the brittle shell breaking away easily—and are ready for cleaning.

There are several advantages of the shell molding process. Included is greater furnace yield. Since a shell molded casting requires less metal than a sand casting and leaves less scrap to be machined or ground off, a larger quantity of usable metal is obtained from each melting furnace. Then, too, working conditions are cleaner because comparatively small amounts of sand are needed. Also, less effort is required because of mechanization and the fact that a shell mold weighs only about one-tenth



Fig. 2. Adhesive strips are placed on mating faces, and the mold halves are pressed together by hand.



Fig. 3. The press here shown is employed for final closing, pressing the two halves into one hollow shell mold which is now ready for pouring.

al

in

al

sl

01

bi

ir

Ca

tr

It

fi

of a sand mold. Floor space is saved since shell molds occupy less than one-third the area required by conventional sand molds.

Another advantage is that shell molds can be made in advance and stored indefinitely, whereas the making of sand molds must be synchronized with the melting of different alloys because they tend to dry out. Also, shell molds can be made automatically at higher rates than is possible with conventional sand molds. As

previously mentioned, machining costs are substantially reduced since shell molding permits casting closer to the required finished size. On one automotive part, only 0.030 inch of stock per side is allowed on the shell mold casting for subsequent finishing, compared to 0.200 inch per side left on sand castings of the same part. On another part, the amount of chips removed is 8 pounds less than with a sand casting. If subsequent machining is required, the smoother, cleaner surfaces of shell mold castings permit using higher cutting speeds. Finally, shell molded castings have a better appearance because of superior surface finish and less adherence of the sand to the casting.

Today, after months of test runs, mass production of shell molds for casting of stainless steel is standard foundry practice at Cooper Alloy. Current applications include the high production of commercial stainless-steel valve bodies, bonnets, fittings, and other valve parts and castings. About thirty different alloys have been cast in this manner, with as many as fifteen cast in one day. One limitation to the process has been the high cost of patterns and plastic resins. However, it is believed that shell molding, as it is perfected, will permit foundries to produce castings more economically and under substantially better working conditions. Even now, the increased use of stainless-steel parts is being considered because of the elimination or reduction in necessary machining, and consequent cutting of cost.



Fig. 4. This completed shell mold, which can be made in quantity lots and stored indefinitely, will be employed to cast six elbow pipe fittings of stainless steel.

Fig. 5. Simple pouring rack holds twelve shell molds in an upright position for pouring. Extra support or backing up of the molds is not necessary.

yed ves

b-

ts

)n

ck

ıg

ch

t.

ed

If

r,

it

ell

e-

0-

SS

rhessyostt



Shell mold casting is adaptable to practically any metal, and certainly to any metal now being cast in sand molds. The process is particularly suitable for casting aluminum, iron, bronze, and stainless and other alloy steels. Developments in the application of the process to magnesium and low-carbon steel are progressing rapidly.

Among the many present-day applications of shell molding in other foundries are the casting of parts for farm equipment, aircraft, automobiles, and ammunition. A promising application in the aircraft industry is in the manufacture of jet-engine blades. In the automotive industry, camshafts, rocker arms, valves, crankshafts, and transmission parts have been cast in this way. It was thought that the process would be confined to small parts, but castings weighing over 200 pounds have been produced.

Although Cooper Alloy is using aluminum patterns, other foundries have had good results in making them from alloy cast iron or "nonshrink" steels. Another variation is that some foundries close the molds by clamping their outside edges with spring wire, or by bolting the mold halves together. The use of adhesives is simple and easy, but some molds have insufficient area for this method.

A major advantage of the technique developed by this company is the elimination of back-up for the molds during pouring. Many foundries back the molds with round, cast-iron or steel shot to resist deformation of the mold wall by the metal being cast. Disadvantages of the use of shot are the chance of overheating, the need for cleaning the shot, and the danger of loose shot on the floor in the pouring area.

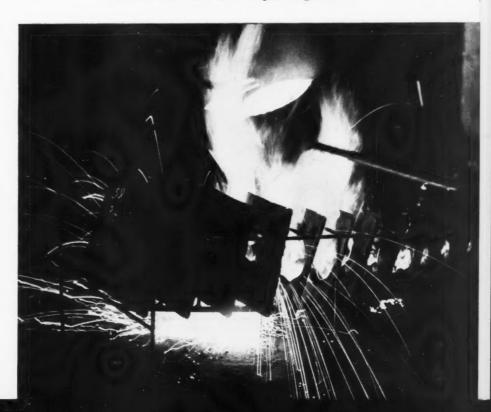
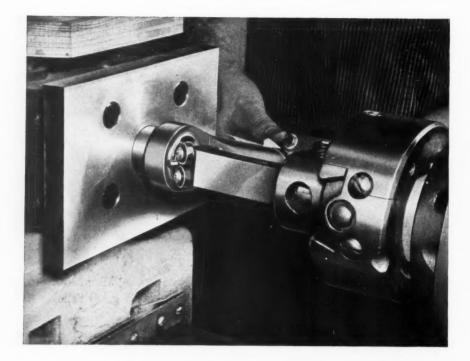


Fig. 6. Close-up view of the operation in which molten stainless steel at a temperature of 3100 degrees F. is poured into the shell molds.

Machinery, August, 1952—187

Swaged Bearing Retention for



By GILBERT C. CLOSE

ETHODS employed to retain bearings in their housings depend largely on the type of loading encountered in service. With axial loading only, simple staking has proved effective. However, when high and variable thrust loads are involved—loads that will react with direct stress against the retention

method employed—staking is less dependable. The "lips" of housing metal displaced in the staking process have no dependable metallurgical values for use by design engineers, and under severe loading may shear off or be pressed back in place, thus allowing the bearing to slip from its housing in service.

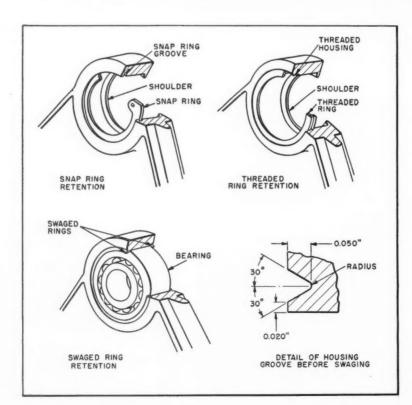


Fig. 1. Three methods of retaining bearings in their housings. In the swaging method, a ring of housing material is swaged over the bearing chamfer.

Moderate to High Thrust Loads

An alternate method of bearing retention involves the use of snap rings or threaded rings, Fig. 1, installed in the bearing housing. While highly dependable under all types of loading, snap- or threaded-ring retention is expensive and involves considerable machining time. Furthermore, the thrust loads encountered during service, while too high for a staked bearing, may not require the full retention strength of a mechanical ring, nor justify the expense of such an installation.

To overcome this situation and provide an alternate method of bearing retention applicable somewhere between that of staking and snapor threaded-ring installation, tooling engineers at Northrop Aircraft, Inc., Hawthorne, Calif., decided to investigate the possibilities of swaged bearing retention. The method was found to be highly successful where the housings are approximately the same thickness as the bearings, but it is not a cure-all for the problems involved. As was intended, its application is best suited to bearing retention where thrust loads will be moderate to high, but do not require the ultimate retaining strength provided by snap- or threaded-ring installations. There are enough such applications to make the swaging process a valuable addition to shop knowledge. A short description of Northrop research and results will illustrate ideal applications and limitations.

ble.

the

ical

der ack

om

Press, spin, and roll swaging were tried, and of the three techniques, roll swaging was most effective. Press swaging was attempted, using a 1.750-inch diameter bearing with its housing. The tool shown in Fig. 2 was employed, and pressure was applied by a laboratory testing machine. The housing metals used included steel having a tensile strength of 165,000 pounds per square inch, wrought 75S-T aluminum and FS-1h magnesium alloys, and an aluminum casting alloy. A V-shaped groove of the type shown in Fig. 1 was machined in the housing prior to swaging.

Press swaging of the pre-grooved ring around the bearing was successful with the more ductile alloys such as steel and annealed aluminum alloys. However, with materials of limited ductility, such as 75S-T aluminum, FS-1 magnesium, and the casting alloys, the bending stresses involved cracked the press-swaged ring near the root of the groove. Loads required to push the bearing from the press-swaged housing were high for the ductile alloys, thus indicating the possibility of press swaging, with limitations, for such materials.

Spin swaging was tried next. Using the same materials, bearings, groove type, and conditions as for press swaging, the housing rings were swaged over the bearings with a friction type spinning tool mounted on a drill press, as shown

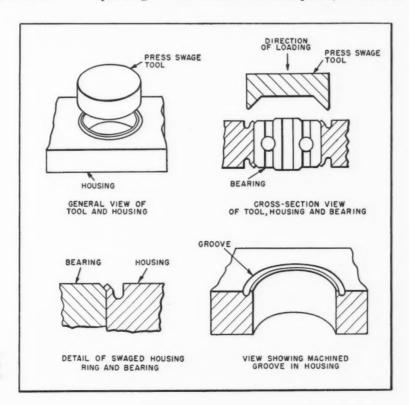
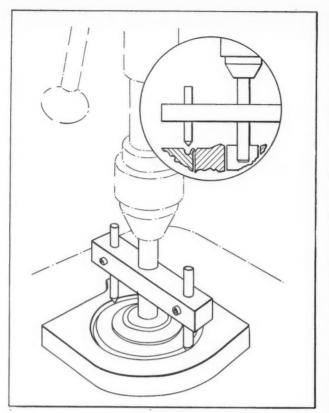


Fig. 2. Press swaging has proved to be a successful method of retaining bearings in their housings when the housings are made of a ductile alloy.



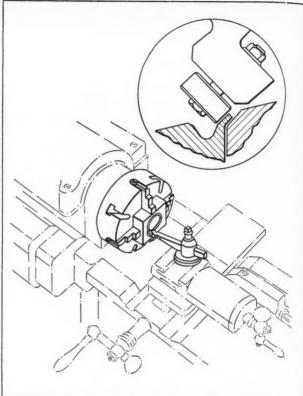


Fig. 3. In the spin-swaging method of bearing retention it was found that the nose of the tools rapidly dulled on hard materials and galled the softer metals.

Fig. 4. A roller tool, held in the toolpost of a lathe, is employed to swage a ring of housing material over the chamfer of the bearing that is to be retained.

Design Data for Roll-Swaging Process (See Fig. 5 for Dimensions)

Housing Material	Groove Depth A, + 0.005 — 0.000 Inch	Chamfer Depth B, Inch	For Replaceable Installations		For Permanent Installations	
			Dimension E, ± 0.002 Inch	Load, Pounds per Inch*	Dimension E, + 0.005 - 0.000 Inch	Load, Pounds per Inch*
Aluminum (75S-T6)	0.045 0.025	0.060 to 0.035 0.034 or less	0.010 0.007	220 210	0.025 0.015	550 450
Magnesium (FS-1h)	0.045 0.025	0.060 to 0.035 0.034 or less	0.010	82	0.025 0.015	205 165
Steel†	0.045 0.025	0.060 to 0.035 0.034 or less	0.010 0.010	325 435	0.025 0.015	810 650
Aluminum Casting (356-T6)	0.045 0.025	0.060 to 0.035 0.034 or less			$0.025 \\ 0.015$:::
Magnesium Casting (AZ63-HT)	0.045 0.025	0.060 to 0.035 0.034 or less	0.010	110	0.025 0.015	275
Steel Casting (SAE 4130)	0.045 0.025	0.060 to 0.035 0.034 or less	• • • • •		$0.025 \\ 0.015$	

*Loads listed refer to the load per inch of housing circumference, and, therefore, apply to all diameters. †S A E 4130 (tensile strength 165,000 to 185,000 pounds per square inch)
S A E 4140 (tensile strength 185,000 to 200,000 pounds per square inch)
S A E 4340 (tensile strength 200,000 to 220,000 pounds per square inch)

in Fig. 3. Later tests were made with the spinning tool mounted in a lathe.

Since only a small area at a time was "worked" during spin swaging, the bending stresses were less than when the whole ring was press swaged at one time. Another trouble did, however, develop. Despite the hardness of the spinning tool (61 Rockwell C), the tool nose became rounded when swaging the harder materials, and with softer materials severe galling of the swaged ring occurred. Cracking, as had been experienced in press swaging, did not occur.

With this data to go on, the simple roller tool seen in Fig. 4 was designed. This tool was mounted on either a lathe, as shown, or a milling machine, and used on bearings varying from 1.750 to 3.500 inches in diameter. Housing materials consisted of all the commonly used wrought and cast alloys.

A series of tests were run, varying the tool face angle from 45 to 70 degrees with relation to the housing bore axis. With a tool angle of 45 degrees, cracking of the ring due to bending stresses occurred with the less ductile materials

such as 75S-T aluminum and FS-1h magnesium alloys. With an angle of 70 degrees, insufficient clearance of the tool was experienced on some types and diameters of bearings. Thus, 60 degrees was established as the optimum tool face angle for swaging.

The machined ring in the housing was tapered from top to bottom on some specimens while parallel sides were used on others. From data gathered in these tests, it was found that the optimum ring shape had a taper from top to root of 30 degrees to the housing bore axis. Cracking occurred in the less ductile materials when parallel groove sides were used.

In another series of tests, the thickness of the ring (dimension F, Fig. 5), the depth of groove (dimension A), and the amount of swaging (dimension E) were varied to determine the dimensional limits and optimum conditions. It was found that dimension F was satisfactory, both physically and metallurgically, in the range of 0.015 to 0.040 inch thickness, so a dimension of 0.020 inch, plus 0.005 inch minus 0.000 inch, was established as the optimum.

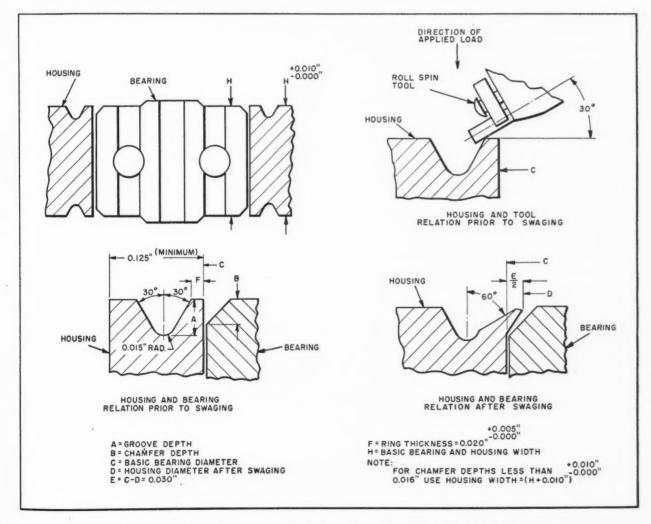


Fig. 5. Design details recommended for the roll-swaging process of retaining bearings. Dimensions for various housing materials are given in accompanying table.

The maximum depth of groove (dimension A) consistent with satisfactory metallurgical properties was found to be 0.050 inch. The amount of swaging (dimension E) was also attempted at 0.050 inch, but when it was discovered that microscopically visible shear occurred in some cases, this was reduced to 0.030 inch.

Using these standardized dimensions and tolerances, specimens of several materials were roll swaged over 0.75- to 3.50-inch diameter bearings, and the load at which the swaged rings failed was recorded. In some cases, identical tests were conducted to determine possible variations in failure load. On the basis of these tests, it was determined that a safe design load for roll swaged bearings would be

Design load
$$=$$
 $\frac{\text{Failure load}}{1.5}$

In determining the design load, however, the manufacturer's rated thrust load for the bearing must be taken into consideration. Whichever is lower—the rated or the design load for the roll swaging process—should be used in the design. The materials tested included S A E 4130 steel having a tensile strength of 165,000 pounds per square inch; S A E 4340 steel (200,000 pounds per square inch); 75S-T6 aluminum; FS-1h magnesium; S A E 4130 cast steel (165,000 pounds per square inch); 356-T6 sand-cast aluminum; and AZ63-HT sand-cast magnesium.

After evaluation of all tests, design data was compiled as set forth in the accompanying table, and dimensions for design and fabrication were derived as shown in Fig. 5. The research was augmented by metallurgical examination of selected specimens to determine more accurately optimum results and the nature of any faults.

Conclusions reached at the end of the research are as follows:

- 1. Press swaging and friction spinning are unsatisfactory methods for retaining bearings in all but the more ductile materials such as 24S-O or 75S-O aluminum alloy or steel having a tensile strength of 125,000 pounds per square inch or less.
- 2. The roll-swaging method is excellent for retaining bearings in the more brittle and notch-sensitive materials as well as in the ductile materials.
- 3. Final design criteria for the roll-swaging method of retaining bearings are presented in Fig. 5 and the accompanying table. As shown, the roller tool must be at an angle of 30 degrees to the housing face. The table lists the necessary design data to produce satisfactory and consistent results for the roll-swaging process.
- 4. The roll-swaging method of retaining bearings is readily adaptable to production. Tests were all conducted on lathes or milling machines with test tools. With proper means of controlling axial tool penetration, the same general method could be used on a heavy-duty, low-speed drill press. The set-ups shown require only one tool and one tool-holder to cover all diameters of bearings. However, for each different bearing bore, a separate locating device to position the bearing and housing in the work-holding fixture will be necessary.

Tips on Forming Chromium Stainless Steel

Many sheet metal fabricators are now forming the straight chromium grades of stainless steel, such as Armco 17. While chromium stainless steel will take most ordinary forming without damage, it is not as ductile as the chromium-nickel steels.

It is important that radii be as liberal as possible, particularly where a severe bend must be made parallel to the rolling direction. Because of the tendency of the metal to crack more readily in this direction, jobs should preferably be laid out so that severe bends will be at right angles, or at least at an angle of 45 degrees to the rolling direction.

Here are some specific recommendations:

90-Degree Bends in Material 0.05 Inch (18 Gage) and Lighter—These should give no trouble. If the radius is sharp, "orange peel" may show at the point of bend. This condition is not

harmful, but can be lessened by an inside radius at the bend of at least one metal thickness.

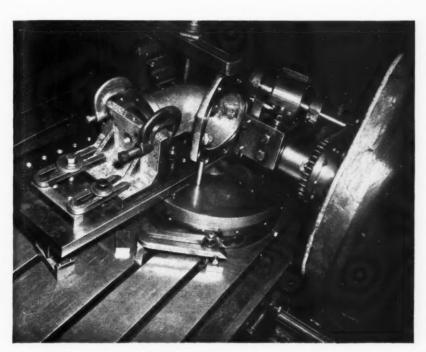
90-Degree Bends in Material Heavier Than 0.05 Inch—The inside radius at the bend should always be at least one metal thickness.

180-Degree Bends in Material Lighter Than 0.05 Inch—Usually, but not always, these bends can be made flat, if the bend is across the direction of rolling. If the bend is parallel to the direction of rolling, the inside radius of the bend should be at least one metal thickness. This means there should be room for two thicknesses of metal in the bend after forming.

180-Degree Bends in Material 0.05 Inch and Heavier—The inside radius at the bend should always be at least one metal thickness if the bend is across the direction of rolling, and at least two metal thicknesses if the bend is parallel to the direction of rolling.

INGENIOUS Mechanisms Selected

Mechanisms Selected by Experienced Machine Designers as Typical Examples Applicable in the Construction of Automatic Machines and Other Devices



Oscillating Mechanism Produces Groove of Uniform Depth in Concave Surface

By LEWIS B. PAYZANT

The mechanism shown in the accompanying illustrations was designed to permit the use of a horizontal boring mill for machining grooves of uniform depth to receive "O" rings around

the plano-concave flanges of cast elbows, one of which is shown in Fig. 1. The mechanism oscillates a circular table on which the work is clamped while the tool rotates. As a result, the plano-concave surface being machined is carried to the tool and removed from it in a manner that insures a uniform depth of cut around the periphery of the groove. As may be seen in Fig. 2, an adapter A with a sprocket is

vas of ely

ch

re

gg

as ng re

or hile

ng

in he

to

ry

n-

r-

ts

29

lg

d

11

ol of

g

le

Fig. 2. Horizontal boring mill set-up for producing a groove of uniform depth in the plano-concave flange of an elbow.

Machinery, August, 1952—193

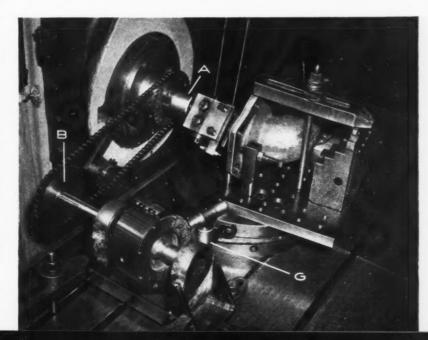
Fig. 1. Angular throw mechanism used in conjunction with a circular table on a horizontal boring mill permits a groove to be machined to a uniform depth within plus or minus 0.005-inch total indicator reading.

bolted to the spindle of a boring mill. The adapter bore has sufficient clearance to allow the spindle of the boring mill to be extended or retracted without interference.

The driven sprocket B is of the same size and pitch as the driver and turns a spherical ball C, Fig. 3, through a shaft at any spindle speed so that synchronization of speeds between the angular throw of the mechanism and spindle is maintained. The ball is mounted in an adjustable housing which is locked to it by

means of a socket head set-screw that is engaged in a radial keyway milled into the ball parallel to the shaft axis.

Ball bearings D are lightly pressed on hubs at each end of the housing, and suitable retainers E are employed to load the bearings and eliminate end play. A shaft F is fastened to a flat on the housing by means of a flange having elongated holes that permit adjustment of its



position to insure equal travel on each side of the shaft axis. The shaft is a close slide fit in a sleeve H that is supported on a spindle G, Fig. 2. The spindle pivots freely on ball bearings. The flange of the housing in which these bearings are contained is made to suit the curve of the circular work-table to which it is fastened. The bolt holes in this flange, too, are elongated.

In operation, the rotating boring mill spindle turns the spherical ball to which the housing is locked. As the ball races rotate on the hubs of the housing, they transmit a backward and forward motion to the outer casing, since this member is restricted from radial motion by the shaft fastened to the work-table. The resulting movement of the shaft oscillates the circular table so that the grooving tool is always presented with the same amount of material to remove, despite the plano-concave surface of the work.

The circular table is centered exactly under the center of the machine spindle, and in setting up the work, two vertical rods in the table are employed to align the flange of the work with the center of the table. The work is then clamped by means of straps and jacks located behind the flange. An indicator is used to check the vertical alignment of the work by obtaining a zero reading at the top and bottom of the flange.

This check is followed by applying the indicator at the horizontal center line and adjusting the angular throw of the mechanism to obtain a zero reading here also. Once the angular throw has been established and locked, it remains constant throughout the operation so that plus or minus 0.005-inch total indicator reading will be the maximum variation around the groove. This tolerance is also held for the tooling.

Toggle-Action Drill Jig that Clamps Work at Four Points

By RUDOLPH SACHTLEBER

In driling hold-down bolt holes through the steam cylinder heads for duplex piston pumps, it was found that the location of the holes was

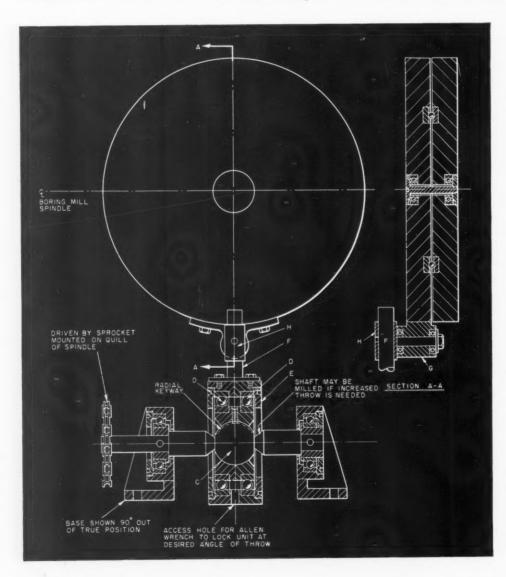


Fig. 3. Diagram of an angular throw mechanism that oscillates a circular table on the boring mill shown in Fig. 2

Work-piece (X), which is a cast steam cylinder head for a duplex piston pump, is rigidly clamped at four points in this toggle action drill jig.

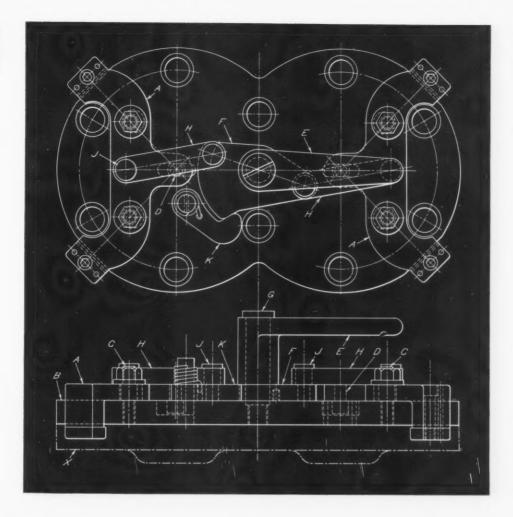
he

er-

ro

ding a ow nor be

it



often inaccurate. The original jigs employed for drilling such holes at the Harrison, N. J., plant of the Worthington Corporation, were simply flat plates of the same shape as the cast heads to be drilled. These bushing plates were equipped with vertical pads around their peripheries to form nests for the castings. However, due to variations in the size of the castings, many of the work-pieces would be a loose fit in the jigs, thus resulting in inaccurate location of the drilled holes. To overcome this difficulty, the drill jig seen in the accompanying illustration was designed to accurately clamp the work at four points by means of a single toggle action.

The two clamping arms A are slidably mounted on bushing plate B by means of studs C, the central portions of these studs passing through large holes in the arms to permit their free movement. Pins D are a loose fit in the centrally located projections on the clamping arms, and their lower, enlarged diameter ends are provided with flats to fit slots milled in the bushing plate. This permits the arms to pivot about these pins and to slide along the slots when operating handle E is rotated.

Cam F, which is rotated by handle E about stud G, is connected to clamping arms A by links

H. These links can pivot about the loose-fitting studs J joining them to the clamping arms and cam. A spring-loaded latch K holds the cam, levers, and arms in the work-clamping position shown, or in the loading position when the cam is rotated counter-clockwise.

As the cam is rotated counter-clockwise, latch K will be rotated clockwise and links H will become aligned with each other. This forces clamping arms A outward, away from each other, so that the jig can be placed over work-piece X. The cam is then turned clockwise to the position shown, and arms A are pulled together firmly to clamp the work for drilling. Ten holes, 3/4 inch in diameter, are drilled through the cylinder head castings in this operation.

Iron ore is mined beneath the sea more than two miles from shore near Bell Island, Newfoundland. A system of belt conveyors is being installed to help bring the ore from beneath Conception Bay to the surface on the island. The system will be able to lift 1000 tons of ore an hour from a depth of 1730 feet. This mine is expected to yield 2,800,000 tons of ore in 1952.

Engineering News

Aluminum Mock-Up Speeds Airplane Production

The possibility of speeding up the engineering and manufacturing program for the Convair-Liner 340 by the use of a dimensionally accurate mock-up led the Consolidated Vultee Aircraft Corporation, San Diego, Calif., to build an aluminum mock-up with production tooling. Almost an exact replica of a production model transport, the mock-up provides engineers with a three-dimensional lay-out for all design stages.

Convair mock-ups of the past were constructed principally of wood, and were used mostly for space allocation purposes and for the location of major equipment items. In addition to offering the advantages of a wooden mock-up, the complete metal mock-up permits the planning of all electrical wiring and tubing well in advance of actual production.

Installation problems of interior equipment, furnishings, and fabrics can be readily solved by reference to the mock-up, which shows exact locations and the same attachment materials—metal bulkheads, belt-frames, and stringers—as are found in production airplanes. Another important advantage of the metal mock-up is the fact that planning engineers can determine the most efficient sequence of various components in installation.

High-precision standards are possible because

the mock-up is constructed largely of production type belt-frames, stringers, and floor beams. The nose and constant fuselage sections were assembled in the first fixtures modified for the production of the 340's. Some substitute materials such as soft aluminum-alloy skins were used to facilitate construction of the mock-up. Flush riveting was obviously unnecessary in assembling the fuselage. Rivet heads on the outside of the fuselage are probably the only exterior evidence that the mock-up is not intended to fly.

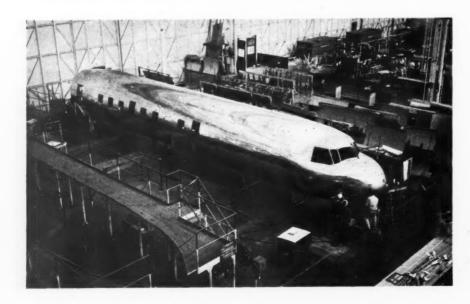
ci

f

New "Gold Standard" Permits Close Control of Surface Finish

A "gold standard" of surface finishes is being made available to industry for improving quality control of machined parts. The new standard is the result of a seven-year joint engineering project by the General Motors Research Laboratories and Chrysler Corporation Engineering Division. A set of precision reference specimens of surface roughness on pure gold master blocks has been perfected, which will permit uniform surface roughness measurements that are accurate to one-millionth inch.

Up to this time, there have been no established standards for surface finishing; each company more or less set up its own, and variations in surface roughness often made it difficult to match



Aluminum mock-up of a Convair-Liner 340 accelerates the manufacture of Consolidated Vultee fortyfour-passenger transports

parts or components from different shops in precision production. Standards defining the new specimens have now been adopted by the Society of Automotive Engineers and the American Standards Association, and are available to everyone.

The new precision reference specimens of surface roughness provide constant roughness values. Thus, engineers or machinists working with precision parts can compare the roughness value of a part with one of the specimen blocks and determine immediately whether the machined surface has the proper roughness value. Replica blocks will, therefore, make it possible for a machinist in a one-man shop, as well as a foreman in a large factory, for example, to calibrate his measuring device by the same standards as were used by the engineers who worked out the original specifications.

n

h

i-

ıg

ıe

1-

ce

is

g l-

S

n

1-

d

y

How Small Scratches on Metal Parts Develop into Large Cracks

Cracking in metal parts caused by the combined action of stress and corrosion can be responsible for spontaneous service failure of objects ranging from brass cartridge cases to stainless-steel coffee urns. Investigations conducted at the National Bureau of Standards by Hugh L. Logan have provided new data on some of the mechanical and electrochemical phenomena involved.

When most metals are exposed to ordinary atmospheres, a thin oxide film is quickly formed that tends to protect the metal from further corrosion. According to the most generally accepted theory, stress-corrosion cracking starts with a scratch or break in this protective film. When the protective film is broken through, the freshly exposed metal is more anodic (negative) than the surrounding film-covered surface, and if moisture is present, an electric current flows that causes the metal to be removed from the exposed area.

To get a better understanding of the forces at work in stress corrosion, electrochemical potentials of five alloys were measured in normal film-covered and film-free conditions, both stressed and unstressed. Potentials were measured first in unstressed specimens having normal thin oxide films resulting from ordinary atmospheric exposure. The same specimens were then tested after the filmed surfaces had been removed by abrasion with metallographic polishing paper. The abrading was done in an inertgas (argon) atmosphere in a dry box, and the potentials were measured without removing the abraded specimen from this atmosphere. Each

metal studied was more cathodic (positive) in the normal film-coated form than in the abraded form by amounts ranging from approximately 0.12 to 0.76 volt.

The electrochemical solution potentials of the same alloys in the normal film-covered conditions were then measured with stress applied. Based on the assumption that when tension is initially applied to a metal, small breaks develop in the protective film, giving corrosion a chance to get started before a fresh film can form, it was believed that if the electrochemical potential of the unprotected area alone could be measured, it would be roughly the same as that of a film-free surface.

To measure this potential, a notched specimen was completely coated with a non-conducting water-proof lacquer, then a razor blade was used to remove a narrow band of lacquer at the root of the notch, where the stress was concentrated. With fairly rapid application of stress, the filmfree area then became a substantial fraction of the total non-lacquer covered area, and the potential became more negative as the stress was increased. When the stress was held constant for some time, the solution potential generally reverted quickly to that of the unstressed metal. However, when the stress was increased rapidly. the measured potential tended to approximate that of a film-free surface as the point of fracture was reached.

Huge Electro-Formed Nickel Mold Produces Radomes for Aircraft

The largest article ever produced in nickel by the electro-forming process is a giant mold made by Bone Engineering Corporation, Glendale, Calif., for the Goodyear Aircraft Corporation. The mold is a split type, 14 feet long by 8 feet wide, and is employed for the low-pressure molding of plastic domes for radar installations on U. S. Navy aircraft.

The electro-formed nickel shell, only 1/4 inch thick, is suitably reinforced with steel ribbing welded to the outside surface, thus effecting extremely light-weight construction. Although the weight of the completed mold is approximately 4000 pounds, this figure is only one-third to one-fifth the weight of a comparable metal mold cast in the conventional way.

This mold was electro-formed in two halves over plastic matrices. The latter are cast with a high finish to close dimensional tolerances, which conditions are reproduced in the finished mold. The time required for the electroplating bath to deposit the large nickel shell was between six and seven days.

Questions and Answers

Damage to Rented Machinery

A. C. K.—I rented some used machinery, and during use, it was damaged. The company from whom the machinery was leased is suing me for the money it

spent in making repairs to the equipment. Can you advise me what to do?

Answered by Leo T. Parker, Attorney at Law Cincinnati, Ohio

If the machinery was damaged through your carelessness, you are fully liable to the owner for the amount of money he spent for repairs. All courts agree that the lessee must exercise at least ordinary care to prevent the leased machinery from being damaged.

For example, in Gregory vs. Williams [35 So. (2d) 451], it was shown that certain machinery and equipment was leased. After return of the equipment, suit was filed against the lessee to recover the cost of major repairs. The higher court decided that the company must pay for necessary repairs, and for failure to return another leased item of equipment.

Welding "Ductile Iron"

M. M. W.—Is the new "Ductile Iron" readily weldable, and, if so, what type of welding electrodes are recommended?

Answered by Editor, "Nickel Topics," Published by International Nickel Co., Inc., New York City

"Ductile Iron" can be successfully welded. Many items are welded without preheating, but tendencies for cracking are suppressed by preheating at 600 degrees F. The best properties are obtained by welding the material in an annealed state, then again annealing it after welding. "Ductile Iron" having low amounts of hardening elements (0.20 per cent manganese and 0.60 per cent nickel, for example) is preferred, especially where machining must be performed subsequent to the welding, rather than ductile iron having high amounts of hardening elements (0.75 per cent manganese and 1.50 per cent nickel, for example).

A Department in which the Readers of MACHINERY are Given an Opportunity to Exchange Information on Questions Pertaining to the Machine Industries

"Ni-Rod 55" or any of the commercially available rods of similar composition give good results. Generally, 1/8-inch or 5/32-inch electrodes are best, although heavier rods are used under special conditions. As low an amperage as is possible that

will permit a steady arc, a good "wash," and a smooth bead should be selected. Preparatory procedure (degreasing, degassing, etc.) corresponds to the accepted technique for welding cast iron.

Low-Cost Removal of Scale from Shell Rings

A large producer of rings for 20-millimeter shells has made substantial reductions in the cost of descaling the rings. Formerly, the company had sent the rings out to a job shop for descaling and brightening, at a cost of about four cents per ring. Now, they are able to do the operation in their own shop at a cost of less than one cent per ring.

The operation is performed in open-end, tilting type tumbling barrels with a hot-water solution of Magnus D-Scale-RS (8 ounces per gallon), without stones or other abrasives. This inhibited acid cleaner provides completely satisfactory descaling (without danger of tarnishing or corroding) and a bright copper color in about fifteen minutes. Rings are descaled in batches of 150 pounds, with the barrel rotating at 40 R.P.M. The same solution is used for three successive batches before it is discarded.

Glass Lubricant Facilitates Steel Extrusion

Solid glass, which becomes liquid and acts as a lubricant at high temperatures, is the key factor in a new process developed for the hot extrusion of steel and now being used by several steel-makers and fabricators. In addition to serving as a good lubricant, the glass or glass-like material also protects the tools from contact with the steel and insulates them from excessive heat. Originally, plate glass was used, but recent tests have proved that fibrous or woven glass is just as effective and easier to handle.

TOOL ENGINEERING

Tools and Fixtures of Unusual Design and Time- and Labor-Saving Methods that Have been Found Useful by Men Engaged in Tool Design and Shop Work

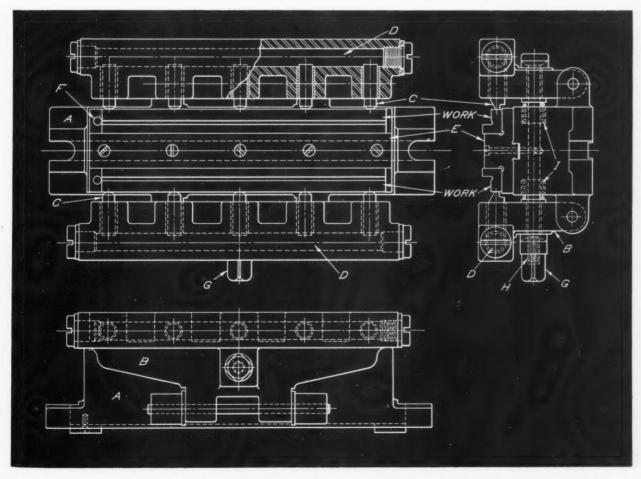
Self-Equalizing, Quick-Acting Milling Fixture

By B. P. FORTIN, Sr., Hartford, Conn.

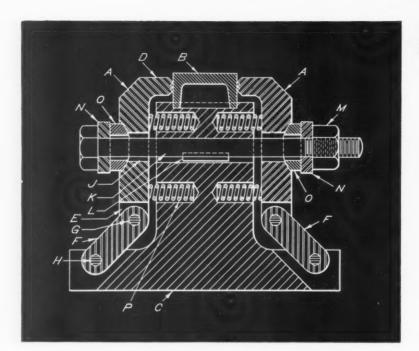
Slender rectangular strips along which an L-shaped form had to be milled presented a work-holding problem that was successfully solved by using the fixture shown in the accompanying illustration. It was decided to mill the job "two-up" on a horizontal machine, using a pair of hole type form cutters. Because of its frail nature, the work had to be secured at five

points along its length. An added complication was that the width of the strips varied from end to end, so that when the operation was originally performed in a conventional fixture, five separate motions were made by the operator in order to apply just the right amount of pressure at the clamping points. As a result, loading and unloading time exceeded actual cutting time.

The present fixture employs a fluid principle to automatically equalize the pressure of the clamps, which can then all be mechanically actuated in a single motion. Hinged to each side of the cast-iron base A of the fixture is a jaw B.



By employing a fluid principle, the strips held in the fixture are readily secured with equal pressure at all points



The resultant force of the closing and downward movements of the jaws of this vise type fixture is to automatically bed the work.

A series of five toe dogs C extends from the inner side of each jaw, and each toe dog is capable of an independent in-or-out movement in the jaw. The inner ends of the dogs enter into one wall of chamber D completely filled with a viscous fluid. Stop-pins limit the distance the dogs can be extended from the chamber, and also prevent the dogs from turning.

After two strips to be milled are positioned in opposite sides of locating seat E and against end thrust pins F, the jaws are closed by pivoting toward each other when nut G is turned on clamping screw H. In doing this, the fluid maintains an equal pressure behind each dog despite differences in the extensions of the dogs occasioned by variations in strip width.

So that the jaws will return to an open position where the fixture can be served, the tightening action of the screw is carried out against the resistance of two springs I. The fluid used is a mixture of beeswax and graphite, reduced with oil to a thin paste. It will not congeal nor does it have to be frequently recharged.

Fixture Jaws Combine Downward Pull with Closing Action

By W. M. HALLIDAY, Birkdale, Southport, England

The design of a vise type fixture that assures rapid, proper, and automatic bedding of work-pieces is illustrated in the accompanying sectional view. This feature is inherent in the movement of the two jaws A. As they close against the side of the work-piece B, which is nested in

the top of the fixture body C, they also exert a slight downward movement.

The upper section of each jaw has a serrated lip D in contact with the work-piece, and the lower section is slotted centrally at E to receive the end of a steel link F, the two members being hinged together by a pin G. The body of the fixture is T-shaped at its base, which, like the lower section of the jaws, is slotted and receives the lower ends of the links. Pins H hinge the links to the base.

The central section of each jaw has a vertical slot accommodating the bolt K. This bolt is a close fit in a hole running through the fixture. A key L in the bolt, engaging a keyway in the hole, prevents the bolt from turning when the nut M is tightened or loosened. Between the bolt head and the nut are flat washers N and bushings O. These bushings are a free fit on the bolt, and also have a convex face which bears in a concave area milled into the outer sides of the jaws.

In the closing action of the fixture, as the bolt is drawn up by tightening the nut, the jaws move centrally. At the same time, the two links fulcrum on the pins H and cause the jaws and bushings to slide downward slightly as a unit. The elongated slots in the jaws and the free fit of the bushings on the bolt permit this downward movement to be made, since the bolt itself remains in a fixed horizontal plane by reason of its fit in the hole through the fixture body.

The closing action is carried out against the resistance of four compression springs P contained in holes in the fixture body. Thus, when the nut is loosened to open the fixture, the jaws will automatically move outward.

This simple drill jig can be readily adapted to different center distances by changing the position and the number of bushing clamps.

ıe

re

g

7-

r

e

al a

9.

e

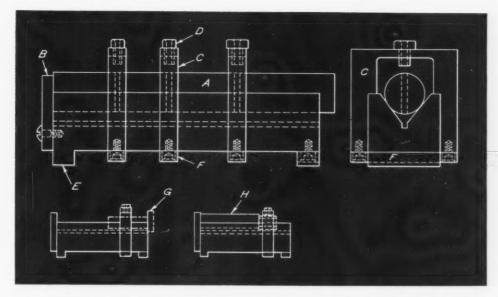
e

t

S

f

d



It can be observed that the center distance between the pins H is sufficiently greater than the center distance between the pins G to incline the links at approximately 45 degrees to the vertical axis of the fixture. The purpose of the curvature at the bearing surfaces of the bushings and jaws is to permit the jaws to rock slightly in adjusting themselves to any variations of the dimension between the gripping surfaces of duplicate work-pieces.

Drill Jig Utilizing V-Block Principle

By J. C. KAISER, Newark, N. J.

Holes to be drilled, reamed, or tapped radially in cylindrical bars can be accurately spaced by supporting the work in a V-block style of drill jig, as shown in the accompanying illustration. Duplicate work-pieces A are correctly located against a stop-plate B at one end of the vee. One or more bushing clamps C containing bushings D can be positioned as required around the body of the block.

The base of the block has legs E which pro-

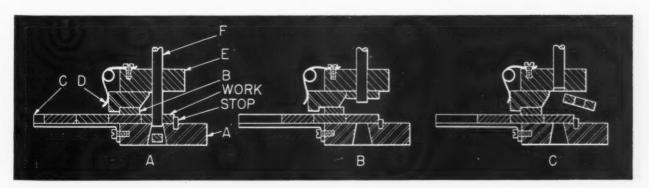
vide an open area for straps F below the clamps. As can be seen in the end view, the straps are screwed to the ends of the bushing clamps, and when tightened fix the bushing clamps to the block. There is a small amount of clearance between the table of the drill press and the straps so that the jig rests solidly on the legs. For the same reason, the holes accommodating the capscrews in the straps are counterbored.

In some applications a shoulder G on one end of the work is used to locate the work from the open end of the vee. If more convenient, a shoulderless object can be located against a filler block H.

Piercing Die Automatically Loads and Ejects Work

By FEDERICO STRASSER, Santiago. Chile

The accompanying illustration shows an inexpensive semi-automatic die used to pierce special blanks as a secondary operation. This die performed satisfactorily and provided a comparatively high production rate.



Semi-automatic piercing die with an efficient ejecting device

The die—mounted in an inclinable press, with the rear part lowered—operates in the following way. The work-pieces are placed successively into the feeder (a simple inclined plane) to slide down until the first is arrested by stops which are made up of dowel-pins. When the press treadle is actuated, the ram descends and the first blank is pierced. As the punches rise, the work-piece adheres to them and in moving upward forces the ejector bars to retract (shown in view B) because of pressure against the bevevel faces. When the work-piece leaves the punches due to the action of the stripper, the spring-actuated ejector bars force the workpiece from the die as shown in view C. The blank easily clears the stop-pins.

In the meanwhile—and precisely at the time the work reaches the stripper as shown in view B—the next blank slides forward on the feeder to contact the stops, ready for the next piercing operation. In this way there is no delay in feeding and the press can work at the maximum number of strokes per minute.

Radii on Edges of Drawing Dies

By J. McDONALD

On dies for drawing cup-shaped parts, the curve used to facilitate the draw of the metal into the die generally takes the form of a circular arc, the radius of which is normally about six times the thickness of the stock.

While this practice gives satisfactory results when thin stock is drawn, heavier gage metals sometimes rupture because of the restrictions

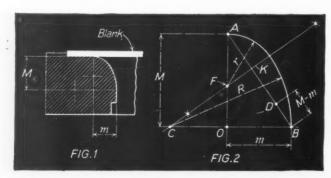


Fig. 1. Die with elliptic curve on drawing edge. Fig. 2. A two-center method for constructing an approximate ellipse

imposed on the smooth flow into the die by the friction of the drawing edge. The tendency to rupture can be reduced by employing a large radius on the drawing edge, but this often seriously lessens the effective width of the flat surface on the die, against which the blank is held by the pressure plate.

For example, consider a drawn cup having an internal diameter of 9 3/4 inches, a depth of 3 inches over-all, and a blending radius of 3/4 inch. When this is drawn from 3/16-inch stock from a blank 14 1/2 inches in diameter, the width of the flat surface is equal to

$$\frac{14.5 - (10.125 + 2.25)}{2} = 1.0625 \text{ inches}$$

where

$$2.25$$
 = twice the radius of the lip = $2 \times 6 \times$ thickness of stock.

While maintaining the same width of flat surface, it is possible to facilitate the flow of metal into the die by forming the edge, not to a circular radius, but to a curve of elliptic form. From experience it has been found that the form of the curve giving best results is obtained by making the semi-minor axis m of the elliptic curve (as shown in Fig. 1) equal to $0.25 \times$ (blank diameter — outside diameter of cup); and the semi-major axis M equal to $0.25 \times$ (blank diameter — outside diameter of cup) \times sec 45 degrees.

In this particular case

$$m=0.25 imes (14.5-10.125)=1.094$$
 inches $M=0.25 imes (14.5-10.125) imes 1.4142=1.547$ inches

There are many ways of laying out an approximate ellipse. A useful two-center method accurate enough for the present purpose is shown in Fig. 2. A distance BD equal to M-m is marked off on AB, and the remaining segment AD is bisected at K by the perpendicular KC. The points of intersection F and C of this line with the axes OA and OB, extended, are then the required centers of the two blending arcs which form the approximate ellipse.

Extended flight above 35,000 feet, now commonplace, would be virtually impossible without silicone rubber—a chemical product which remains flexible after long exposure to such extreme temperatures as 350 degrees above zero or 67 degrees below zero. One modern bomber requires 300 feet of extruded silicone rubber gasket just to seal its bomb-bay doors.



By BERNARD LESTER
Lester and Silver
Sales Management Engineers
New York and Philadelphia



Why Is He Glad to Listen?

STOP a minute to consider why prospects and customers gladly listen to equipment salesmen. Three characteristics of any speaker will hold our attention: First, anyone with a wide reputation for outstanding accomplishment will attract us; second, anyone who presents new ideas on a subject down our line will interest us; and third, anyone who talks well enough to please us, irrespective of who he is and what he says, will draw us to him—at least for a time.

o re

rd

f

al

f

k

S

n

Hence three elements that go to make good listening are reputation, valuable ideas, and a pleasing presentation. Let's examine each more closely.

1. If a man faces us who has shot down ten MIG's in Korea, or some fellow who has discovered a way of driving a machine tool by atomic energy, he certainly will get our concentrated attention. He has really done something. He has a reputation. He captures our initial interest, even though his ideas may be poorly arranged and he may not speak well.

It is the same way with any authority on some machine application. Here is what different purchasers have said to me of some sales engineers:

"With us, that man's got a reputation."

"He's got a record of performance. We can't afford not to listen to him."

2. Even with no background of accomplishment, we can attract attention and hold it if we present ideas of real value to the prospect. As one purchaser put it to me:

"Joe Murphy, when he called last week gave us an idea. We have studied it—there's really something to what he says. He has a solution to our problem."

"I don't care whether Herb Taylor likes tomato juice or onion soup, or wears a bow tie, every time he calls he's got some worth-while idea."

How often we have heard a salesman say, "My machine is well-built and we give excellent

service." Well, isn't this what any salesman would say? Generalities are ideas that are common talk. Even if they trick the ears, and even if they reach the mind, they float right out again. On the other hand, if we say, for instance, "My machine will remove 20 per cent more stock in one-quarter less time than it takes you now," the idea immediately impresses. The statement doubtless needs further proof, for it must be factual, but it bores right into the prospect's mind and captures his attention.

3. Should we listen to a man of personality who talks cleverly, our fancy and senses are stimulated as by a good cup of coffee or a good smoke. We gladly listen. It is a matter of how he says it, rather than what he says.

Not long ago I heard a speaker at a meeting in Brooklyn. During the intermission following his talk, I turned to my companions and said "1 certainly enjoyed his talk."

"Yes, but what did he say?"

For the life of me I couldn't answer that question. He had presented time-worn trivialities, but had done so very well. Such skill touches on the success of a salesman who sells you some well-known item such as ten shares of A. T. & T. stock, or a Manhattan shirt. The art of pleasing by words is at the root of many forms of pure entertainment—plays, movies, radio, and television programs—but in selling industrial equipment, this art only goes so far.

"He's an awfully nice fellow—I like to see him when I've got time. Hasn't got much on the ball, but I do like to listen to him."

Can't we improve as sales engineers if we seriously consider all three of these elements that make "good listening"? Build up our reputation, cultivate the practice of presenting new useful ideas, and constantly develop our manner of speaking in an appealing, pleasant, and entertaining way.

LATEST DEVELOPMENTS IN



DoAll Surface Grinder and Band Machine Developed to Speed Up Jet-Engine Production

Several difficulties which slowed up the production of turbine wheels for jet engines have been eliminated through the use of an "automatic" surface grinder and a special band machine designed by the DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. The difficulties primarily involved two factors. One was the requirement for high precision machining of the blade assemblies (buckets) which are mounted in the turbine wheel, and the other involved trimming the circumference of the bucket-equipped wheel to a circular form and to the desired diameter within close tolerances.

The first problem was solved by the special surface grinder shown in Fig. 1, which is arranged for crush-grinding and is equipped for automatic table skip feed and down feed. Precision grinding jobs can be handled on a production basis. The second problem of trimming the bucket wheel was solved with a band machine equipped with a circle-cutting fixture mounted on a pedestal, as shown in Fig. 2.

The spline section, or root, of the bucket, now being machined on the surface grinder, presents a serious production problem because of the precision relation-

ships which must be maintained between the root and blade, or airfoil, section. Great accuracy is required here since the buckets must operate efficiently in a turbine wheel revolving at extremely high speeds and at very high temperatures. Since the bucket is held in the turbine wheel by means of its root spline which fits a slot in the wheel, the blade-root relationship and root-spline-slot relationship must be accurate if the angular position of the blade in the wheel is to be as precise as required for efficient operation.

The specially equipped surface grinder finishes the five root sur-



Fig. 1. DoAll "automatic" grinder with four of the five special fixtures regularly used to hold jet-engine buckets.

Control panel is seen at the right.

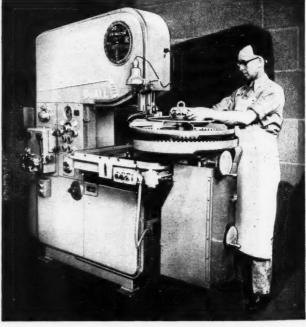


Fig. 2. DoAll "Contour-matic" band machine equipped with fixture for cutting around circumference of bucket-equipped turbine wheel.

Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on Market

Edited by FREEMAN C. DUSTON

faces in each bucket. This includes both spline surfaces, both root ends, and a flat where the root joins the blade. All five surfaces are form- or flat-ground on the same automatic precision crush grinder. Up to five buckets are handled at one time. Each bucket fixture (only four of which are shown on the table of the grinder in Fig. 1) can be rotated, or tumbled, to successively locate each root surface in the correct grinding position. As the table moves, the wheel grinds, in turn, the exposed surface of each

rys-y-syst

With the crush-grinding method, deep cuts are taken, but the table must move at a comparatively slow rate during actual cutting. Thus, the automatic table skip feature reduces production time, for the table can be arranged to move rapidly when the wheel is "grinding air" in the spaces between the fixtures. This is accomplished by skip feed trip dogs operating in conjunction with a skip feed hydraulic control valve shown in Fig. 3.

The automatic down feed, adjustable in increments of 0.0005 to 0.080 inch, increases production, as the operator does not have to be at the grinder constantly to adjust the down feed and can therefore tend several machines. These adjustable controls are shown in Fig. 4. With the bucket fixtures in their proper positions, the wheel is set manually to the

correct starting level; the down feed increment control is set as required, within the range of 0.0005 to 0.080 inch; the down feed limit switch (micrometer adjustment) is set; and the "cycle start" button is pressed on the control panel. The table then makes one cycle (a slow feed stroke and fast return to starting position) and stops; the grinding wheel moves downward the distance determined by the set increment; and the table makes another cycle. Alternate cycling and down feed occur until the down feed limit switch is actuated. Precision finish cuts can then be made directly under the control of the operator.

The table control valve is ad-



Fig. 3. View of surface grinder saddle showing skip feed valve and skip feed trip dogs. This valve is the small button almost underneath grinder table. Depression of button by skip dog causes table to move faster.



Fig. 4. View showing operator adjusting the knob which controls amount of down feed on each pass of wheel. Micrometer adjustment unit for down-feed limit switch and limit switch are shown on vertical rod.

justable for either crush-grinding speed or conventional speed and the automatic features are easily made inoperative. Automatic or single-cycle control is vested in the control panel.

The "Contour-matic" band machine shown in Fig. 2 is equipped with a special cutting fixture for trimming the bucket-equipped turbine wheel to the correct diameter prior to a finishing operation. Accurate fit of this wheel in the engine is necessary for efficient engine operation. When the roots of the buckets have been ground to within the required tolerances on the surface grinder, they are

slipped into the spline slots on the turbine wheel. The bucketequipped wheel is then placed in the fixture shown in Fig. 2 and the ends of the bucket blades are sawed as the wheel revolves.

An electric motor in the fixture furnishes the power for driving the wheel-holding portion of the fixture. With this equipment the turbine wheel is accurately cut to the desired size in one operation. Some turbine wheels may carry as many as ninety buckets. Each jet engine contains, however, several wheels of different diameters, all of which can be cut with this versatile fixture.

Snyder Multi-Station Transfer Machine for Processing Clutch Housings

An automatic twenty-two station transfer machine for performing a sequence of varied operations on a cast-iron clutch housing has been built by Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. Operations performed on this machine include drilling, rough- and finish-

boring, milling, sawing, tapping, spot-facing, counterboring, and chamfering, making a total of 37 operations on 105 surfaces or holes of various dimensions. The machine operates at the rate of 124 cycles an hour.

One of the unusual features is the tool equipment for machining a breather hole 2 inches in diameter at the first station by trepanning the hole from the solid casting and finish-boring it with one tool. At the eighth and ninth stations, normal positioning of milling cutters and transfer rails would have resulted in interference. This problem was solved by dropping or lowering a section of the rails through cam action linked to the milling units.

At the sixteenth station, the work-piece (see insert in illustration) is turned 90 degrees and transferred to another set of rails for further processing in the new position, without being permitted to vibrate or move out of correct location during the transfer movement.

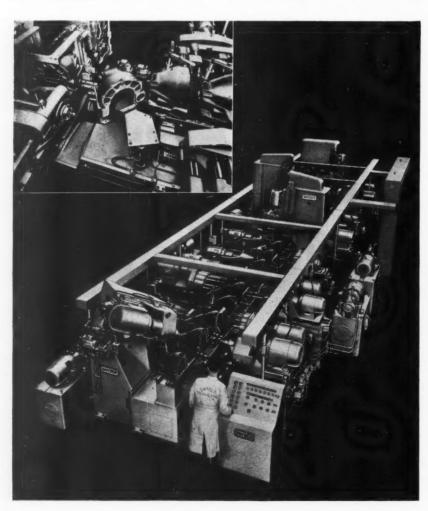
i

Clamping is performed hydraulically through cams, and there are two stations to each cylinder. The double stationary fixture is designed to clamp one or two parts. The work cycle is automatic, but manual push-button control is optional. All heads are individually motor-driven; and indexing, fixture clamping, and feeding operations are performed hydraulically. The machine is completely interlocked electrically so that any partial index, feed, stroke, or improper clamping will stop the machine cycle.

Bench Model Honing Machine and Portable Coolant Unit

A bench Model "J" honing machine with a portable coolant unit is announced by the Superior Hone Corporation, 1614 Elreno St., Elkhart, Ind., which incorporates the basic features of the Model "AL" floor machine. It is designed for production honing of keyways, spline gears, and most broken surfaces, and for internal finishing operations on a bench set-up basis. Infinitely variable spindle speeds range from 400 to 1000 R.P.M. with no changing of belts.

The honing range is for work from 0.185 inch to 2.500 inches in diameter, no adapters being needed. Permanent type mandrels are fitted to the spindle with a bay-



Automatic transfer type machine for processing clutch housings, recently developed by the Snyder Tool & Engineering Co.

Bench model honing machine and portable coolant unit announced by Superior Hone Corporation

onet lock—requiring no tools to change mandrels or stones. Only the stones bear on the work-piece and there is no metal-to-metal contact. The machine is 25 inches high, 13 inches wide, and 16 1/2 inches deep. A 1/3-H.P., 110-volt, 60-cycle, single-phase motor is used to drive the machine.

The coolant unit designed for the honing machine has a range of adjustment and portability that make it adaptable to any dry honing machine, providing a means for rapid conversion from dry to wet honing operations. It slides in and out of brackets permanently mounted on various machines.

e d s w d

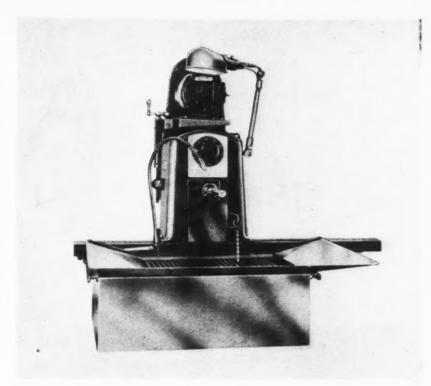
s - s d d d s y

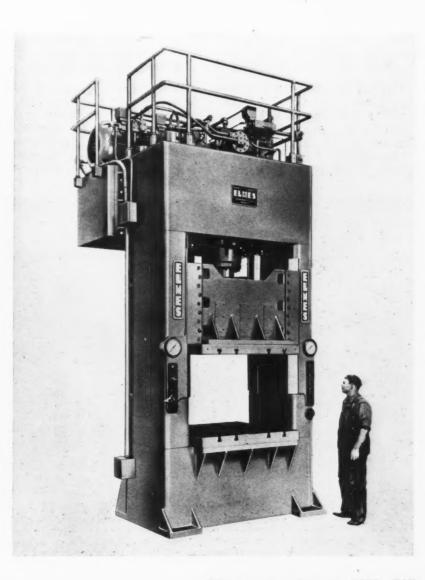
Elmes Drawing and Forming Press

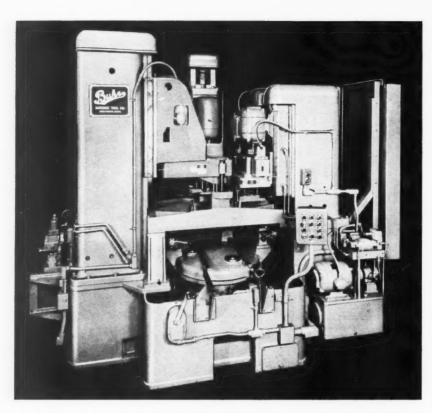
The Elmes Engineering Division, of American Steel Foundries. 1150 Tennessee Ave., Cincinnati 29, Ohio, has built a 300-ton hydraulic press especially designed for a leading manufacturer of farm implements. The press is intended for use in making plow beams. It has a special hydraulic circuit with two pressure cycles in one. Operation is by remote electrical control, using two foot-operated switches. The ram is made to exert a low tonnage pressure by operating one footswitch, and a high tonnage by operating the other foot-switch. The plow beams are bent to a specific angle at low tonnage, and are then turned for flattening at high tonnage.

The press is arranged for pressure as well as position reversal. A simple crank-handle for operating the limit-switch controls is located at the left and an "inching" down handwheel at the right of the operator. The "inching" down handwheel permits the operator to move the platen down as little as 1/16 inch at a time when setting dies. A thermostat in the reservoir automatically stops the press if the oil reaches a critical temperature.

Elmes low- and high-tonnage hydraulic press designed for drawing and forming operations on farm implements







Special machine built by Buhr Machine Tool Co. for drilling operations on supercharger parts

Buhr Special Machine for Drilling Superchargers

Unusual features have been incorporated in a special drilling machine built by the Buhr Machine Tool Co., Ann Arbor, Mich., for use in the manufacture of superchargers for Air Force planes. To insure tool safety, the

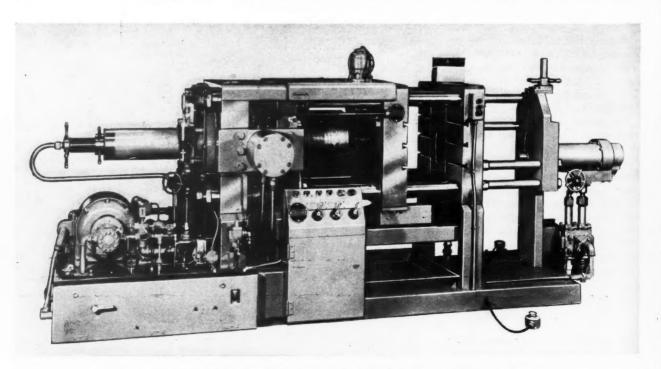
machine has been so designed that the second unit must complete a work cycle followed by one index movement before the third unit can function. Special control equipment also insures a complete work cycle by both the second and third units before the fourth unit can begin its work. With this arrangement, two revolutions of the index table are required to complete one part. All moving parts of the machine are automatically lubricated.

This machine consists of a main base, on which are mounted four Buhr vertical hydraulic drill units, a single-part work-holding fixture, a 36-inch diameter ten-station (unequally spaced) index table, and a centrally located coolant system.

"Wedgelock" Heavy-Duty Die-Casting Machine

A precision-built cold-chamber die-casting machine designed to develop and hold pressures up to 40,000 pounds without opening of die faces and flashing has been designed and built by Cuyahoga Industries, 17920 Waterloo Road, Cleveland 19, Ohio. Dies with cavities 7 1/2 inches deep can be run with an opening up to 15 inches on this machine. A shallow cavity can be run at a 10-inch opening for faster cycling and increased output. The die opening can be set at any point from 10 to 15 inches. Motorized central screw adjustment for regulating die height makes possible adjustments to 0.001 inch.

"Wedgelock" construction eliminates toggle links, and direct



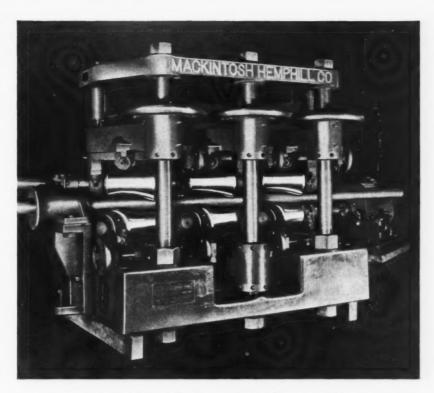
Precision-built cold-chamber die-casting machine brought out by Cuyahoga Industries

locking is employed which is said to prolong die life. The pump that delivers oil to the "shot" cylinder has a relief valve which can be adjusted for pressures of from 1000 to 2000 pounds per square inch. A central hydraulic ejector cylinder takes the place of manual rack-and-pinion ejectors.

Rotary Straightening Machine for Tubing

A Model AN machine has just been added to the line of guideless rotary straighteners for production line straightening of ferrous and non-ferrous tubing built by the Mackintosh-Hemphill Co., 901 Bingham St., Pittsburgh, Pa. This machine will straighten steel tubing in commercial pipe sizes having outside diameters ranging from 1/2 inch up to 1 3/4 inches and will also straighten brass, copper, aluminum, and other nonferrous metal thin-wall tubing in sizes with outside diameters up to 3 inches.

Two high-speed, silent chain type drives, actuated by two 10-H.P. direct-current motors, drive all six forged and hardened alloy steel straightening rolls. Production speeds of from 40 to 400 feet or more of tubing per minute are obtainable, depending upon the type and size of material being straightened. The straightening rolls of this machine have a body



Mackintosh-Hemphill rotary tube straightening machine

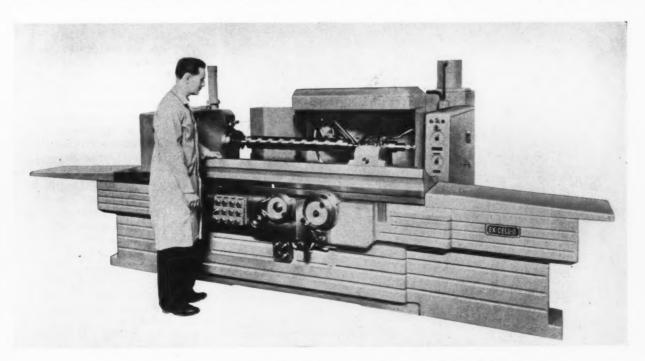
length of 9 1/2 inches, and a diameter at the center of 6 inches. The machine requires a floor

space 12 feet 9 inches by 8 feet 7 inches, and weighs approximately 11,500 pounds.

Ex-Cell-O Precision Thread Grinding Machine

The Ex-Cell-O Corporation, 1200 Oakman Blvd., Detroit 32, Mich., has brought out a large-capacity precision thread grinder designed for grinding threads, worms, and

other formed work. The machine is suited for both tool-room and production work. It will grind single or multiple threads, left- or right-hand, in any pitch from 1



Large-capacity precision thread grinding machine announced by the Ex-Cell-O Corporation

to 128 threads per inch. It can be used with single- or multiplerib grinding wheels. An attachment for grinding accurate internal threads is also available. Several types of diamond dressers can be used on this grinder, the choice being determined primarily by the type of thread or form to be ground.

The relation of work-spindle speed to table feed can be easily changed to produce various leads. This is accomplished by means of change-gears. Most standard leads can be obtained by the use of a set of gears furnished with the machine. Either right- or left-

hand threads can be ground, the change from one to the other being accomplished by simply positioning a lever. Setting the lever to a neutral position permits indexing the work-spindle for grinding multiple-start threads and worms. An automatic indexing attachment is also available.

Automatic functions of the thread grinder include feeding to finish sizes, wheel dressing, work size compensation for dressing, resumption of the grinding cycle after dressing, backlash compensation, control of the coolant flow, lubrication, and retracting the wheel at the end of the cycle.

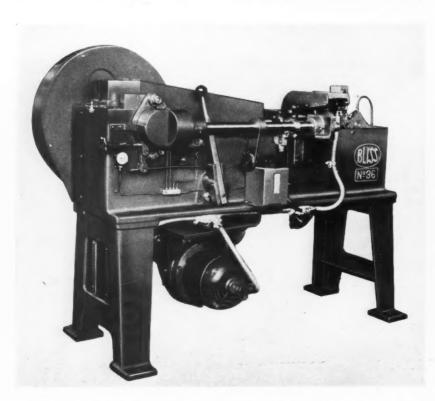
Bliss Press Developed to Pierce Cartridge Cases

Development of a horizontal piercing press, designed specifically for piercing the flash hole in brass or steel 20-millimeter cartridge cases, has been announced by the E. W. Bliss Co., Canton, Ohio. This press has a capacity of 5 tons. It pierces the hole in one case at each stroke and operates at the rate of sixty strokes per minute.

Equipment includes a handfilled chute feed with three stations. The first station serves as a detector to check the position of the case in the chute, the second as the work station, and the third as a detector for checking the accuracy of the piercing operation. The first and third stations have solenoid switches to stop the press if the case is loaded improperly or if the hole is not pierced. The press requires a floor space 30 by 64 inches, and weighs approximately 1800 pounds.

Clausing Drill Press

The Clausing Division, Atlas Press Co., 2353 N. Pitcher St., Kalamazoo, Mich., has announced that an 18-inch heavy-duty gen-



Press for piercing cartridge cases developed by the E. W. Bliss Co.



Heavy-duty general purpose drill press brought out by Clausing Division, Atlas Press Co.

eral-purpose drill press is now available which offers many new features developed for greater accuracy, capacity, and efficiency. This press is designed for production work as well as for use in tool-rooms and service shops.

Outstanding features include massive design for greater tool and job capacity; drive spindle with two sealed-for-life ball bearings—one above and one below the pulley; tough, precision-ground spindle floated free from quill by a similar ball bearing at top and a double-row bearing at bottom; both races in double-row bearing absorb thrust; vernier depth stop with control accurate to 0.001 inche 6 1/2-inch spindle travel for larger work capacity and better use of quick-release chucks; and positioning mechanism which moves both head and table.

The machine will drill to the center of an 18 1/4 inch circle and has a capacity for drilling 3/4-inch holes in steel and 1-inch holes in cast iron. The maximum distance from spindle to table is 39 inches, and from spindle to base, 50 inches. It is available with a production oil table 13 by 18 inches or tilting table 12 by 14 inches.



Fig. 1. Leitz-Strasmann universal measuring microscope introduced in this country by the George Scherr Co., Inc.

Large Universal Measuring Microscope

Tools, gages, and precision parts up to 40 inches in length by 8 inches in width can be measured optically and directly on a universal measuring microscope recently introduced in this country by the George Scherr Co., Inc., 202 Lafayette St., New York 12, N. Y. This massive precision measuring machine, developed by the firm of Albert Strasmann, Remscheid - Ehringhausen, Germany, in collaboration with the optical works of Ernst Leitz, Wetzlar, provides an exceptionally accurate means for measuring small as well as large work. Unlike most measuring microscopes used in tool-rooms, this equipment has provision for mounting the work in a stationary position and making the required measurements by longitudinal and crosswise traverse movements of the optical system.

The rigid work-support is designed to accommodate heavy work and can be pivoted at its center to a given angle for measuring tapers. Settings for such measurements are made by means of a handwheel and angular scale. The maximum center distance is 44 inches and the maximum swing 10 inches. Work without centers

can be mounted on two V-blocks. There is a stage with a glass insert for small flat parts. Glasstop tables, one for work up to 16 inches in length and one for work up to 40 inches in length, are available for measuring large templates and other flat work. The

top plates of these tables can be rotated by a micrometer screw to align the image with the cross-hairs in the main ocular eye-piece. Three adjustable transformers are provided for operating the low-voltage lamps for the two measuring microscopes and the main microscope.

The rear of the base carries the measuring slide, which moves so easily on adjustable roller bearings that it practically "floats" on the ways. Both coarse and fine adjustment are provided for the slide. The reading is made against a permanently fixed, precision metal scale within the bed through a special microscope. The scale has a length of 40 inches. On the main measuring slide, which moves longitudinally, is arranged a cross-slide which is equipped with an 8-inch precision glass scale. This scale is read through a second microscope. The reading microscopes are equipped with novel micrometer oculars which permit direct reading in 0.00005 inch with the possibility of estimating fractions of this amount.

A typical set-up for measuring and checking a large worm mounted between centers is shown in Fig. 1. In this set-up, the standard eye-piece is replaced by a goniometer eye-piece, which is used for measuring the thread angle. This eye-piece can be employed in conjunction with other objectives to permit accurate op-

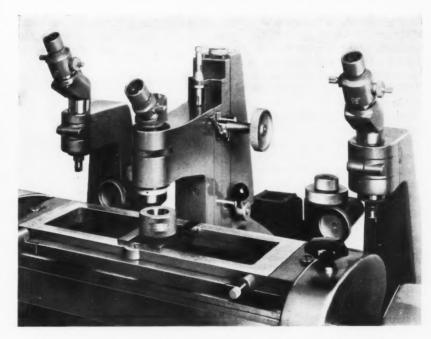


Fig. 2. Close-up view of universal measuring microscope equipped with "Perflectometer" set up for measuring diameter of ring gage

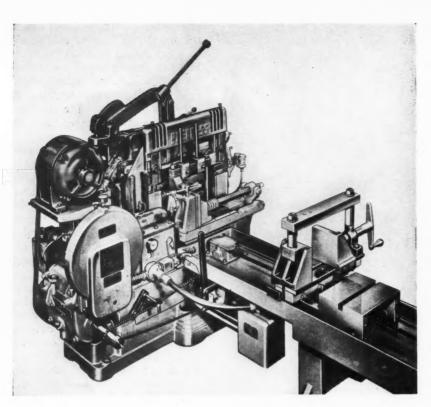


Fig. 1. "Mechani-Cut" hacksawing machine with automatic feed conveyor

tical measuring and checking of work having practically any form or shape. Three interchangeable objectives, which are standard equipment, have magnifications of $9.5 \times$, $20 \times$, and $29 \times$.

The diameters of ring gages, ball bearing races, and similar precision work can be accurately measured at any point by equipping the measuring machine with a Leitz "Perflectometer," as shown in Fig. 2. The design of this instrument is based upon the principle of using the surface of the part to be measured as a mirror on which the image of a line is projected by light rays to optically contact the surface to be measured. In the application of this principle two microscopes are located on a common optical axis. The upper microscope can be seen above the ring gage in the illus-The other microscope tration. which is below the ring gage projects a hair-line cross, the reflected image of which is observed in the upper microscope. Thus the surface being measured is located between the two microscopes.

For measuring, the specimen is brought up to the optical axis so that the mirrored line image, which is the same shape as the profile of the surface observed, appears in the eye-piece. The accuracy when using the "Perflectometer" is twice that obtained by a direct microscopic reading, or \pm 0.000004 inch.

In measuring the ring gage shown in Fig. 2, the "Perflect-ometer" is adjusted to make optical contact with one side of the bore at the desired height. It is then traversed longitudinally until optical contact is made with the diametrically opposite side of the bore. The longitudinal movement of the instrument, as measured on the highly accurate stationary scale, provides the de-

sired diameter measurement. This equipment makes possible optical contact with vertical, angular, irregular-shaped, or curved surfaces and permits distances between surfaces so contacted to be accurately measured.

sq

sec

sir

of fee

me

of

S.

St

"A

the

pr

of

col

filr

dr

wo

ha

lig

un

of

dia

fac

car

no

at

sec

acc

inc

ou

sp

Hacksawing Machine with Automatic Feed Conveyor

"Mechani-Cut" hacksawing machines manufactured by the Peerless Machine Co., 1602 Junction Ave., Racine, Wis., can now be equipped with an automatic bar feed conveyor with a magnetic clutch. This equipment provides for a completely automatic sawing cycle. The magnetic clutch, shown in Fig. 2, is of simple construction with only three major parts, and is designed to assure smooth, uniform operation. It never requires adjustment and permits completely automatic operation of the sawing machine from the time the conveyor is loaded until the last piece is cut off.

The clutch embodies a new principle which is said to assure fast engagement and smooth, dependable machine operation. Solenoids and mechanical linkages are eliminated. When either magnet coil is energized, the armature disc and the rotor plate are instantly attracted, and then drive through friction in full, positive magnetic couple.

magnetic couple.

"Mechani-Cut" machines provided with the stock feed conveyor will automatically saw pieces to the predetermined length from bar stock, pipe, tubing,

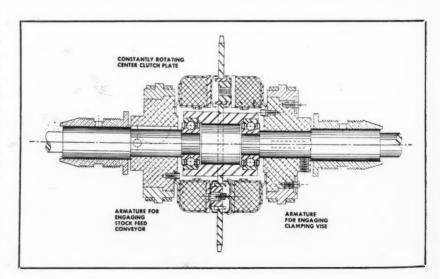


Fig. 2. Magnetic clutch of simplified design which controls automatic feed conveyor of machine shown in Fig. 1

squares, channels, I-beams, web sections, heavy billets, and other forms of stock—which can be fed singly or nested to the capacity of the machine. The automatic feed conveyor is available for "Mechani-Cut" hacksawing ma-

al

r-

e-

e)

h

r

a-

n

oe

ar

ic

es

12

'n

on ad

i-

es

nne

1e

st

W

re

e-

es g-

re

n-

7e

chines in 7- by 7-inch and 11- by 11-inch capacities. Conveyors can be furnished in 12-, 16-, and 20-foot lengths. The automatic feed will operate accurately in lengths from as small as 1/8 inch up to 24 inches or 48 inches.

High-Precision Abrasive Cutting Process

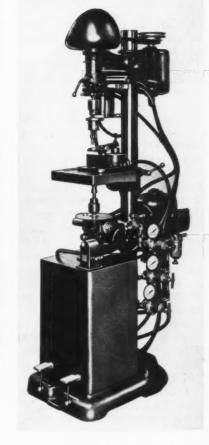
Cutting hard materials by means of a high-velocity stream of gas-propelled abrasive particles is a new process developed by the S. S. White Dental Mfg. Co., Industrial Division, 10 East 40th St., New York 16, N. Y. The "Airbrasive" unit developed for the application of this process provides a fast, accurate method of performing a number of highprecision operations, including controlled removal of metallized films from glass and ceramics, drilling thin sections of hard-towork materials, cutting extremely hard or brittle materials, etching, light deburring, and polishing.

In operation, the "Airbrasive" unit directs a gas-propelled stream of abrasive only 0.018 inch in diameter against the work surface through a sintered tungstencarbide nozzle. As it leaves the nozzle, the abrasive stream travels at approximately 1100 feet per second taking extremely fast and accurate cuts. The cutting action is accomplished without the usual increase in temperature and without pressure and vibration. Despite the ease with which it cuts hard and brittle surfaces, the "Airbrasive" unit has practically no effect on resilient or soft materials, such as rubber, cloth, and certain types of plastics.

The "Airbrasive" unit operates on a 110-volt, 60-cycle alternating current. It measures 8 1/2 by 15 by 12 1/2 inches, and has a net weight of 42 pounds. In addition to the necessary detachable connections, spare parts and test equipment, the unit is supplied with two right-angle and one straight nozzle. The right-angle nozzles are used for manual operation while the straight nozzle is used for production work where it can be held in a fixed or automatically operated jig.

Mead Semi-Automatic Drilling Machine with Opposed Spindle Heads

The Mead Specialties Co., Department SS-26, 4114 N. Knox Ave., Chicago 41, Ill., has announced that an ingenious semi-automatic machine which drills both the large cavity hole and the shaker holes in novelty wood salt and pepper shakers at the rate of 420 per hour has been designed and built by the Crusota Engi-



Semi-automatic drilling machine built by Crusota Engineering Co., using units manufactured by the Mead Specialties Co.

neering Co., Springfield, Mo., using Mead drill press feeds, air cylinders, and air valves.

A blank piece to be drilled on this machine is placed in the fixture on the table and a control valve opened to clamp the work in place. The foot pedal shown at the right in the illustration is depressed to start the lower drill unit which produces the large cavity hole. The pedal at the left is then depressed to prepare the upper drill unit for operation as soon as the lower drill has completed its work. The upper drill withdraws automatically as soon as it has finished drilling the shaker holes. The work-piece is released by moving the valve control lever to the neutral position. Moving the valve lever to the left releases a blast of air which blows the chips from the fixture, thus completing the working cycle.

The operation cycle for the salt and pepper units is set to drill the large cavity to a depth of 2 1/2 inches, and the shaker holes to a depth of 1/2 inch.



"Airbrasive" unit for cutting hard materials brought out by the Industrial Division, S. S. White Dental Mfg. Co.

High-Speed "Burr-Master" for Chamfering Zerol Gears

The first in a new line of "Burr-Master" machines for chamfering zerol bevel gear teeth is announced by the Modern Industrial Engineering Co., 14230 Birwood, Detroit 4, Mich. This machine deburrs and chamfers tooth edges at both the heel and the toe. It will perform these operations on a 99-tooth, 12.53-pitch aircraft zerol bevel reduction gear 8 inches in diameter in thirty seconds.

Pressing the cycle start button brings the work into the cutting position by means of a pneumatic cylinder. The teeth are then chamfered by rotating the work in timed relation to the cutting action of four dovetail type high-speed steel form tools. When the cutting cycle is completed, the work is lowered into the unloading position automatically.

The four form tools are actuated by a combination rocker arm motion that gives a generating cutting action which chamfers and deburrs the tooth edges well around the root of the gear tooth, leaving a burrless surface.

The zerol bevel gear is located in the fixture by a pilot. Three spring-loaded locators spaced 120 degrees apart on the outside of the fixture are provided for radial positioning, which is easily and quickly accomplished by depressing any of the locators into a tooth space. Clamping of the work in the fixture is accomplished by sliding a C-washer over a drawbar and turning a handwheel under the fixture.

The machine base is of fabricated rolled edge box construction and the head frame is alloy cast iron. Design features include special alloy bronze rocker arm bearings that withstand high compression loads, an overload clutch that prevents damage to machine parts in case of accidental overloads, and a precision type indexing mechanism that runs in a bath of oil. The machine requires a floor space 28 by 40 inches, is 70 inches high, weighs 2200 pounds, and is powered by a 1-H.P. motor.

Kenco Punch Presses

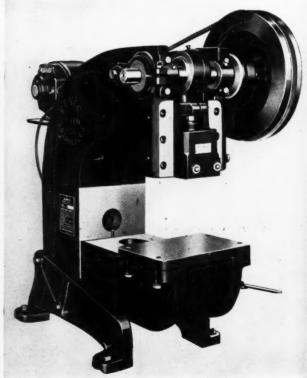
A line of 4- and 5-ton small-size punch presses has been announced by the Kenco Mfg. Co., 5211 Telegraph Road, Los Angeles 22, Calif. Both sizes of presses are available in open-back and deepthroat models. The ram clamp of all models has a square hole which is adjustable to fit shank sizes from 1 inch to 19/16 inches. The clutch drive has a safety feature which protects the presses from damage in case of excessive overloads, and there is a non-repeat mechanism which eliminates the possibility of double tripping.

The 4-ton press operates at a speed of 285 strokes per minute, while the 5-ton model has a variable-speed range of from 90 to 285 strokes per minute. standard stroke lengths are 1 inch or 1 1/4 inches, but presses with longer strokes up to a maximum of 3 inches are available. Openback inclinable presses have a bed area of 7 by 10 inches and a die space from ram to bed of 6 7/8 inches. Deep-throat presses have a throat depth of 12 3/4 inches, bed area of 16 1/2 by 10 inches, and die space from ram to bed of 7 1/4 to 10 1/4 inches. The 4-ton inclinable press has an over-all height of 28 inches and weighs 275 pounds, while the deep-throat model is 32 1/2 inches in height and weighs 400 pounds.

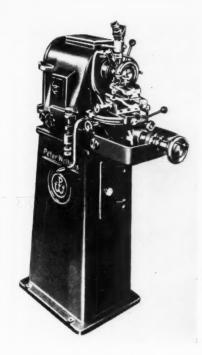
The 5-ton inclinable press is 28 inches in over-all height and weighs 460 pounds. Legs are available for converting these bench models into floor types.



"Burr-Master" machine for chamfering zerol bevel gears, brought out by the Modern Industrial Engineering Co.



Kenco 4-ton deep-throat press with movable bed and provisions for converting to a horn type press



h

es

ie

·e

m

r-

it

10

0

16

h

h

m

d

ie

re

s,

s,

f

11

18

it

ıt

d

Carbide tool grinding machine introduced by Cosa Corporation

Carbide Tool Grinder

The Cosa Corporation, 405 Lexington Ave., New York 17, N. Y., is introducing in this country a machine designed for rapid, precision grinding of carbidetipped tools. This machine, made by Peter Wolters, Germany, has two concentric diamond wheels for rough- and finish-grinding.

The outer wheel can be advanced for the rough-grinding operation and retracted so that the inner wheel is in position for finish-grinding without changing the tool set-up. The positioning of the wheels for either rough- or finish-grinding is easily accomplished by moving a lever.

The tool is clamped on a graduated, compound table that can be adjusted and pre-set for all cutting angles and radii. An optical micrometer for centering the tool bit and for checking the nose radius is built into the machine.

"Diversimatic" Centerless Grinder

The "Diversimatic" No. 1 centerless grinder (formerly known as the "Promatic" No. 1) is now superseded by the Model No. 1-R machine of greater capacity and improved design, according to the Diversified Metal Products Co., 5125 Alcoa Ave., Los Angeles (Vernon) 58, Calif. This improved machine will handle stock of any diameter up to 1 1/2 inches and is recommended for operation with 5-H.P. motors only.

A complete line of accessories is now available for this machine, including automatic air-operated stock ejectors, outboard roller support attachments, toggle cam

devices to provide greater width of opening between the wheels, and automatic cycling attachments for in-feed grinding. When the latter attachment is used with a hopper feed (not supplied), the "Diversimatic" becomes an entirely automatic machine,

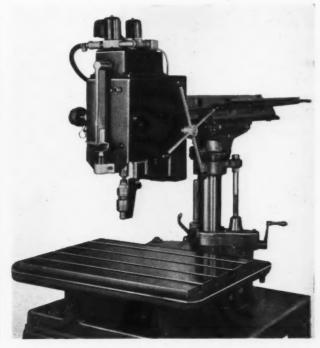
Garvin "Power-Torque" Tools

New larger size "Power-Torque" tools designed to increase the capacity range to 0 to 2760 inchpounds are being manufactured by Garvin Brothers, Inc., Box 536, South Bend, Ind. Special tools can also be custom-made for even higher torque capacities. These tools operate on the principle of measuring torque in motion. This feature makes possible production line torque testing of pre-loaded bearing assemblies such as are incorporated in transmissions, steering gears, and differentials.

The MA-500 air-driven model is typical of these higher capacity tools. Because of the high torque of the larger models, they need to be mounted. The MA-500, illustrated, is mounted on the arms of a Walker-Turner radial drill press. Like the portable models, the stationary models control torque at high speed with precise accuracy (within 2 per cent of prescribed torque limits). When they are



Improved centerless grinder brought out by the Diversified Metal Products Co.



Garvin "Power-Torque" tool mounted on a Walker-Turner radial drill press

used in production, there is no need for subsequent hand torque inspection, and scrap is drastically reduced. The tools can be supplied with air power, electric, or high-cycle electric motors. A built-in reversing system is used on stud drivers. A variety of quick-change wrench attachments is available for nut-running, screw-driving, and the driving of various types of fasteners.

Zagar Heavy-Duty Drilling Machines

Heavy-duty drilling machines designed to drill as many as 600 holes at one time have been brought out in four sizes (16, 24, 32, and 40 inches) by Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio. These machines have the capacity for taking heavy thrust and torque loads

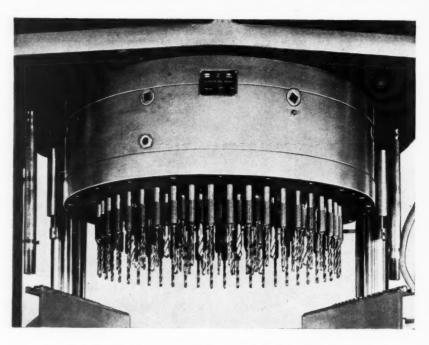


Fig. 2. Multiple-spindle Zagar gearless drill head which permits changing quickly from one job to another

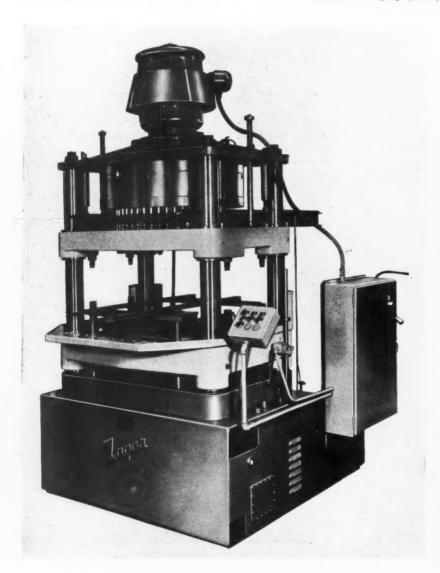


Fig. 1. Zagar heavy-duty drilling machine

and will drive Zagar gearless drill heads with a large number of drills arranged in a large-area pattern. These drill heads make it possible to change quickly from one job to another.

The multiple drill heads are driven directly by electric motors ranging from 5 to 30 H.P. A hydraulic ram in the base of the machine feeds the work to the drills and automatically lowers it to the starting position after the drilling is completed. Cycling may be completely automatic or semiautomatic, and is actuated hydraulically through electrical controls. The machines are completely self-contained, with oil and coolant reservoirs, pumps, hydraulic controls, and electric motors located in a steel base. The four sizes of machines will handle work ranging from typewriter frames to turbo-jet engine frames.

Deep-Hole Drilling Unit

A completely automatic deephole drilling unit using the step-by-step feeding principle is being introduced by the General Pacific Corporation, 1501 E. Washington Blvd., Los Angeles, Calif., and the General Detroit Corporation, 2200 E. Jefferson, Detroit, Mich. The unit can be readily installed on most drill presses, including Atlas, Buffalo, Canedy-Otto, Delta, Walker-Turner, etc. It is mounted above the machine spindle.



Automatic deep-hole drilling unit

The drill unit begins its first cycle by rapid approach to the work, stopping about 1/32 inch

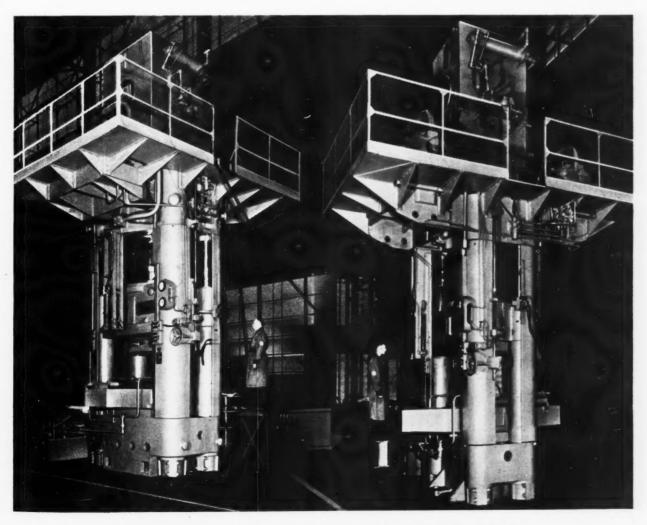
above it. The second cycle feeds the drill into the work at an infinitely variable drill feed speed and to a "step" depth which varies from 1/32 to 5/8 inch. The next cycle is an automatic rapid retraction from the work to prevent chips from falling off the drill and dropping back into the hole. This also allows the coolant

to enter the partially drilled hole. Again the drill approaches the work, stops just before reaching it, then advances into the feed cycle. This operating sequence is repeated until the predetermined depth of hole has been reached, when the drill withdraws from the hole and the machine automatically stops.

H-P-M Presses Equipped for Heading Cartridge Cases

The Hydraulic Press Mfg. Co., 1042 Marion Road, Mount Gilead, Ohio, has announced that it now has in production presses which are especially equipped for cartridge-case heading operations. The view at the left in the accompanying illustration shows one of these presses—a 2500-ton cartridge-case heading press. At the right is shown a 1500-ton cartridge-case pre-heading press.

These H-P-M heading presses are equipped with special controls which permit heading steel or brass cases equally well. Each press is equipped with a shuttle feed which operates automatically from front to back and a tool-slide on the main platen which also operates automatically, making possible a one- or two-hit heading operation by means of push-buttons and selector switches. The shell is automatically ejected as the shuttle moves out of the press. A duplicate control station at the rear of the presses permits twooperator control. All presses are self - contained, with hydraulic power and control equipment, such as pumps, valves, etc.



Cartridge case heading and pre-heading presses built by Hydraulic Press Mfg. Co.

Lake Erie Traveling Head Straightening Presses

The smallest of a complete line of versatile traveling head straightening presses designed and manufactured by the Lake Erie Engineering Corporation, 170 Woodward Ave., Buffalo 17, N. Y., is shown in the accompanying illustration. These improved presses, ranging in capacity from 200 to 2000 tons, feature optional two-speed ram travel in both longitudinal and transverse directions over the entire bed area. thus reducing the set-up and operating time required for straightening work. The presses in this line are available with either one or two traveling heads.

Unusual strength provided by the dovetailed keys on the side frames which grip the bed in a pincer-like action during pressing operations is a feature of these presses. Additional rigidity is provided by large horizontal keys that secure the side frames to the cross-head above the bed and to the cross-tie below the bed. Other features include the use of wheels for smoother traversing action; totally enclosed gearing; adjust-

able pressure and stroke controls; combination of push-button and hand-lever controls; and Lake Erie fast-opening surge valves which eliminate additional piping for rapid approach and return cycles of the ram.

"Di-Acro" Hand-Operated Roller for Sheet-Metal Forming

A hand-operated roller which can be used for rapid forming of cylinders from 16-gage sheet steel has been announced by the O'Neil-Irwin Mfg. Co., 559 Eighth Ave., Lake City, Minn. This equipment has a cam-actuated idler roll which makes it possible to form cylinders 1 inch in diameter or larger, in two passes through the rolls. The cam-operating lever lowers the idler roll to allow insertion of the material, and also raises the roll to a preset position which determines the diameter of the cylinder or circular-shaped part to be formed. On the first pass through the



"Di-Acro" hand-operated sheet-metal bending machine announced by the O'Neil-Irwin Mfg. Co.

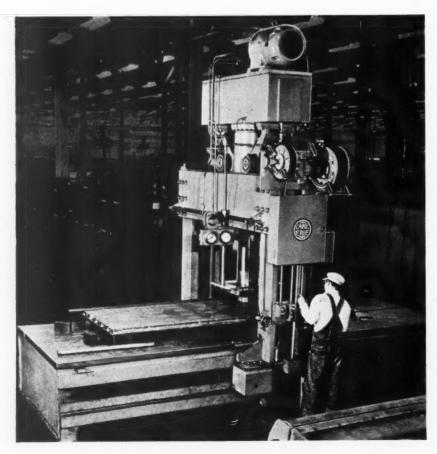
roller the work is formed to a half circle, and on the second pass the circle forming is completed.

Bends can be located in any position along a sheet of material being formed in the new roller, since the material can be fed through the rolls without starting the bend until the cam-lever is engaged. As a result, a wide variety of shapes with straight sections on both sides of the bend can be produced. Round, flat, and square stock—as well as many other ductile materials-can be formed with this machine. The maximum material forming capacity of the roller is 1/4 inch round steel bar and 1/4 inch tubing. Special rolls can be supplied for unusual bending jobs.

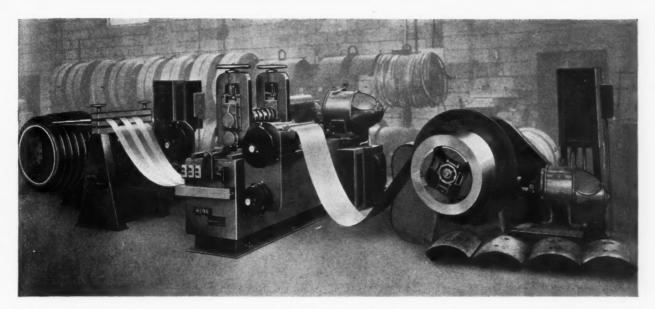
The "Di-Acro" roller is available in two sizes. The No. 1 roller forms material up to 6 inches in width, and the No. 2 roller, up to 12 inches. Both machines will form material to a 1-inch diameter or larger.

Williams Ratchet Repair Kits

Two new ratchet repair kits for 3/8-inch and 1/2-inch square drive "Superratchets" have been added to the line of tools made by J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y. In addition to a complete assortment of replacement parts, each repair kit contains one special spanner wrench. This wrench fits the retaining ring or gland which is the only part requiring a tool for assembly or disassembly.



Smallest of a line of traveling head straightening presses manufactured by the Lake Erie Engineering Corporation



Rotary slitter for strip steel developed by Herr Engineering Co.

Precision Rotary Slitter for Strip Steel

A precision rotary slitter designed for use by strip steel producers or fabricators which provides new features has been developed by the Herr Engineering Co., Warren, Ohio. One removable crank adjusts the guides to the width of material being fed and another crank regulates the centering of the material. Once the width adjustment is made at the beginning of the coil, only the operation of one crank is needed to insure maintaining an even amount of scrap on both sides.

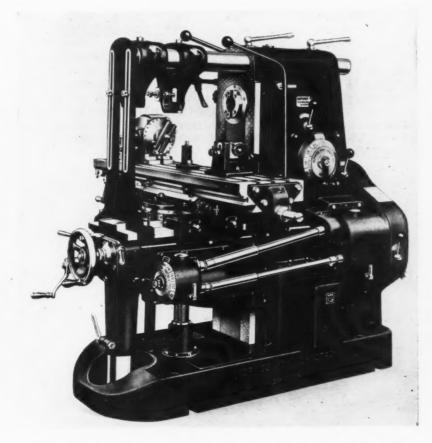
Another feature of the slitter is the provision for easy removal of the members carrying the top arbor bearings. Up and down adjustment of these members is made by means of handwheels, a dial indicating the amount of the adjustment. The slitter will handle material up to 0.125 inch thick, but it also can be used as a driven slitter to handle material as thin as 0.001 inch.

The pay-off reel has an expanding overhung mandrel which fits into the core of a coil and grips it when expanded, preventing the wraps of the coil from slipping over each other. This expansion can be effected manually or automatically. For extremely light gage material, the pay-off reel is motor-driven, and for low speeds the material is maintained in a free loop in front of the slitter. A speed reducer is driven through a silent chain by a direct-current motor. The drive from the re-

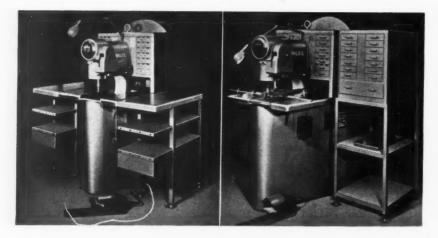
ducer to the main shaft is through heavy roller chain. All chain drives are protected by adequate guards.

Koping Milling Machines

A new line of horizontal and vertical milling machines manufactured by the Koping Co., Sweden, has been announced for sale in the United States by the American Pullmax Co., Inc., 2455 N. Sheffield Ave., Chicago 14, Ill. Accessories and adjustment controls make these machines particularly well-suited for both toolroom and production work, or for use wherever close precision work and rugged dependability are major considerations.



Koping milling machine introduced in this country by American Pullmax Co.



(Left) Combination work-tables and tool racks placed on each side of Wales "Fabricator." The table-rack combination, adjustable front to back, is shown in the "back" position. (Right) "Fabricator" with auxiliary cabinet and tool racks

Combination Work-Tables, Tool Racks, and Cabinets for Wales Sheet-Metal "Fabricators"

Combination work-tables and tool racks, and auxiliary cabinets with tool racks that are now optional equipment for the Wales sheet-metal "Fabricator," are being manufactured by the Wales-Strippit Corporation, 345 Payne Ave., North Tonawanda, N. Y. These combination work-tables and tool racks are placed on each side of the Wales "Fabricator" and are the same height as the bed table. The combination shown at the left in the accompanying illustration is adjustable front to back, and is equipped with leveling feet, and has additional work and storage area for more efficient operation.

The new auxiliary cabinet and tool rack shown at the right in the illustration provides additional drawers to hold punch assemblies and dies and two shelves for storing other tooling.

DoAll Minute and "Super Size" Optical Flats

Two new optical flats of unusual size are now being made available by the DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. The exceptionally large optical flat shown in the illustration is 10 inches in diameter and affords adequate area for checking the flatness, size, and parallelism of large pieces. The small flat illustrated is 1 inch in diameter, and is adapted for checking tiny surfaces such as the

anvil of a micrometer or the ends of precision studs, etc.

In spite of the size of the 10-inch flat, it is available in the same accuracy specifications as the 1-inch flat. In terms of "deviation from absolute flatness" the accuracies available are 0.000001, 0.000002, and 0.000005 inch. Each flat is marked with the exact accuracy in millionths of an inch and this accuracy is maintained the full width of the flat.

The flats may be obtained with one or both surfaces lapped to the stated accuracy. They are manufactured of pure, fused Brazilian quartz, selected for clarity and minimum thermal expansion.

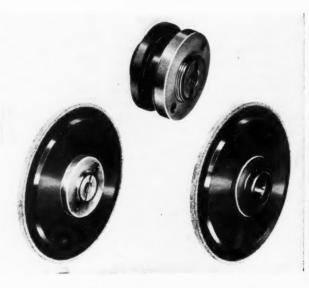
The two new sizes further extend the company's line of flats which includes diameters of 2, 3, 4, 5, and 6 inches. Some of these sizes are also furnished in square as well as circular shapes.

Reversible Wheel Adapter

A reversible wheel adapter has recently been added to the line of products made by the Accessory Division of the Detroit Milling Cutter Co., 28625 Grand River Ave., Farmington, Mich. The illustration shows standard perdiamond wheels iphery type equipped with the adapter. When the wheel wears on one edge, as from grinding forms or chipbreaker grooves, it can be reversed on the spindle without the delay and expense of re-truing the wheel. The adapter remains mounted on the wheel at all times. It permits quick and accurate



A large and a small optical flat recently added to DoAll line



Grinding wheels equipped with reversible adapter

wheel reversal for grinding leftand right-hand tools or parts and saves set-up time.

The reversible wheel adapter is designed for No. 2 Brown & Sharpe and similar machines having a 1-inch spindle with taper of 3 inches per foot, and is constructed with a lock washer to prevent loosening by wheel rotation regardless of its position.

"Gyro-Flo" Portable Compressors

The Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y., has rounded out its line of "Gyro-Flo" portable compressors by the addition of three new sizes having capacities of 315, 210, and 105 cubic feet per minute. Smaller dimensions, greatly reduced weight, and discharge temperatures at least 100 degrees lower than previous portable compressors are features claimed for these units.

The two-stage, oil-cooled, rotary sliding-vane compressor design is said to eliminate difficulties experienced with reciprocating units previously used for portable service. There are no valves to leak, no pistons, rings, rods, or clutch to wear. Air, discharged at a temperature of less than 200 degrees F. under normal operating conditions, together with thorough oil separation, eliminates hose deterioration caused by heat and oil. The continuous rotary action provides a steady flow of air without pulsations or vibrations. The large 600 model weighs 9500 pounds, and the small 105 model 2630 pounds.



Squaring shear of new series announced by the Wysong & Miles Co.

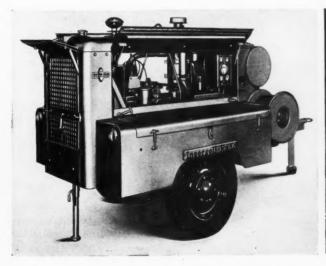
Wysong Introduces Squaring Shears

A new series of 1/4-inch power squaring shears built in 4-, 6-, 8-, and 10-foot cutting length capacities has been marketed by the Wysong & Miles Co., Greensboro, N. C. These shears are constructed from massive "Hi-tensile" castings. They have ball-bearing, precision back-gages which are adjustable to 0.0078 (1/128) inch by means of a handwheel at the front of the machine. The holddown action is provided by roller and cam action. Individual compression springs in each holddown foot compensate for any variations in the thicknesses of the metal being sheared.

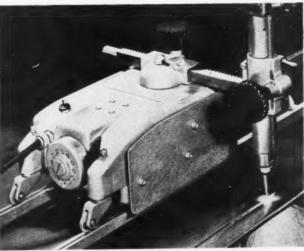
A full length open space between hold-down and knife-bar makes the cutting line clearly visible and facilitates cutting to a scribed line. To insure accurate shearing, the surfaces where the end frames and bed join are hand scraped to a close fit. To facilitate accurate measurements from the cutting line, adjustable stainless steel scales are embedded in various positions on the surface of the table. Each shear is tested by an automatic tripping device for twenty-four hours before leaving the factory.

Portable Machine Carriage for Flame-Cutting and Welding

A lightweight machine carriage for straight-line, bevel, and circle cutting of metals, as well as many types of welding and flame-treating jobs, has been built by The Linde Air Products Company, Division of Union Carbide and Carbon Corporation, 30 E. 42nd St., New York 17, N. Y. This Oxweld CM-45 machine is designed to do many jobs in the small metalworking shop and to provide a low-cost portable machine carriage to supplement heavier equip-



Ingersoll-Rand "Gyro-Flo" rotary air compressor



Machine carriage for flame-cutting and welding

ment in larger plants, shipyards, and mills. It weighs only 33 1/4 pounds complete with blowpipe, and can be moved easily from one job to another. Its compactness also makes it convenient for use in close quarters.

This equipment is housed in a sturdy, one-piece aluminum casting, and is powered by a heavyduty electrically reversible motor. A centrifugal type governor covers a stepless speed range of from 4 to 32 inches per minute. Other speeds are possible if special motor gear heads are used. A simple gearing system and a mechanical clutch permit disengaging the gears for free-wheeling. Operating controls consist of a threeposition (on-off-reverse) motor switch, a speed-control dial that can be pre-set or instantly adjusted at any time during operation, and a two-position clutch

lever. Starting, stopping, and reversing can be handled by a single control when the clutch is engaged.

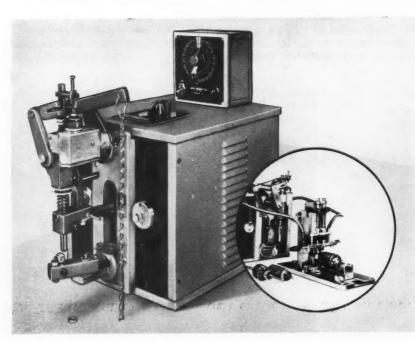
The two forward wheels serve as drive wheels. These wheels are knurled for better traction and the tread is hardened to give longer wear. The rear wheels are swivel casters that can be locked in position for straight-line work. Bevels can be cut at practically any angle, top or bottom, either in straight lines or circles. The blowpipe can be set at the desired bevel angle by means of an adjusting pivot having a calibrated indicator dial. Circles with diameters of from 2 to 54 inches can be cut quickly and accurately. Flame-treating jobs, such as low-temperature stress-relieving, flame-hardening, and flamesoftening, are also easily handled with this equipment.

Resistance Spot-Welding and Soldering Machine

Joyal Products, Inc., 56 Belmont Ave., Newark 3, N. J., has announced the availability of its new Model 5000 WVS resistance spot-welding and soldering machine equipped with a timer. This machine is designed for the manufacture of small metal products. It will solder or weld, in less than a second, larger and heavier parts than those handled by the Model 1000 and 2000 machines built by the company.

This machine will also silver-

solder, soft-solder, and spot-weld precious and dissimilar metals. It spot-welds steel parts up to 3/16 inch in thickness; copper to bronze and copper to copper up to 0.040 inch thick; and brass to brass up to 0.080 inch thick. It will solder brass up to 1/4 inch in thickness, as well as sterling silver and other precious metals. The machine has a quick adjusting device for pressure control and length of electrode travel for positive soldering and welding.



Joyal resistance spot-welding and soldering machine



May quick-change chuck has been introduced by the Kurt Orban Co.

Quick-Change Chuck Designed for Precision Work

n

iı

Si

m

tl

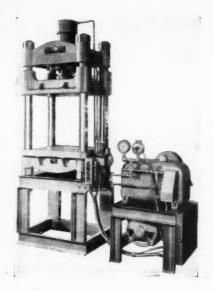
f

A German-made May speed chuck built especially for precision work and to permit rapid one-hand tool changing at high spindle speeds is being distributed in this country by the Kurt Orban Co., Inc., 205 E. 42nd St., New York 17, N. Y. A conical bearing surface in the casing head of the chuck shown at the left in the illustration eliminates end play, and thus reduces tool breakage as well as spoiled work.

The drill is inserted in the adapter shown at the right in the illustration and is locked in place or released by means of the knurled drift pin at the top of the adapter. The knurled collar on the adapter is loose and does not rotate with the body of the adapter. This permits the operator to insert the adapter into the continuously rotating chuck on the machine without coming into contact with rotating parts. The adapter is removed from the chuck by one-hand action, as shown in the inset.

Rodgers "Blue Ribbon" Line of Platen Presses

Rodgers Hydraulic, Inc., Minneapolis 16, Minn., is introducing a completely new line of industrial platen presses in capacities ranging from 10 to 500 tons. These presses are available with multi-



"Blue Ribbon" platen press introduced by Rodgers Hydraulic, Inc.

ple platens for rubber and plastic molding, laminating, metal forming and shaping, die tryouts, and utility applications.

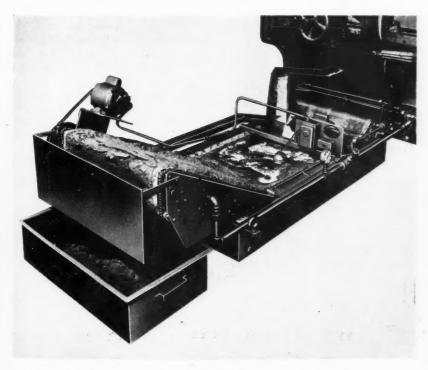
The presses in this line are said to be designed to allow a maximum deflection not to exceed 0.0005 inch per inch of span on each of the work platens, when the full rated load is applied uniformly over the entire working area. Heavier construction can be supplied where work requires less deflection.

A two-speed hydraulic hand pump developing a maximum pressure of 10,000 pounds per square inch with automatic shift or a two- or four-cylinder power-driven pump delivering 2 1/2 or 5 1/2 gallons of oil per minute, respectively, can be supplied with the presses. For faster approach and return speeds, the two power-driven pumps can be furnished with either auxiliary pumps or accumulators.

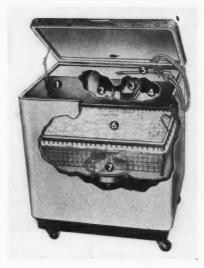
Delpark Industrial Endless Belt Filter

An endless belt filter that permits the same filtering media to be used over and over is being manufactured by the Delpark Corporation, and sold by the Industrial Filtration Co., both of Lebanon, Ind. This filter is designed to serve individual machine tools or large central coolant systems. It can also be applied in other industrial fields through the application of various filtering media which are now available.

The self-cleaning filter separates solids from liquids that will flow by gravity through filter material, and discharges the solids in a relatively dry state into an outside container. The filter is made in units having capacities ranging from 2 gallons to 1000 gallons per minute. In many cases the filter can be readily fitted over existing tanks.



Endless belt filter made in wide range of sizes by the Delpark Corporation



Storm-Vulcan "Turbo-Blast Jr." washing machine

Turbo-Blast Washing Machine

A washing machine for use in shops requiring a small-parts cleaning unit has been developed by Storm-Vulcan, Inc., 2225 Burbank St., Dallas 19, Tex. This machine—the "Turbo-Blast Jr."—has a standard "Turbo-Blast" impeller driven by a 1/2-H.P. motor which causes tremendous agitation of the solution.

The machine constantly filters the cleaning solution and is equipped with a power rinse device. It has an automatic safety feature which closes the lid instantly, thus smothering flame in the event of fire when a volatile cleaning solution is being used.

The unit is 35 1/2 inches high, 29 1/2 inches wide, and has a tank depth of 17 inches. The parts basket is 26 inches long, 14 inches wide, and 6 inches deep.

Rockwell Carbide-Tipped Circular Saws

A complete line of standard type and "on-the-job" engineered and precision fabricated tungstencarbide tipped circular saws, including sizes from 6 to 36 inches in diameter, is announced by Rockwell Tools, Inc., 1314 Kinnear Road, Columbus, Ohio. These saws are designed to cut materials which are difficult or impossible to cut with a saw of ordinary steel. They are recommended for cutting all wood, fiber boards, hardboards, laminates, plastics, and highly abrasive materials.



Chromium carbide samples for test applications announced by Carboloy Department of General Electric Co.

Kit of Chromium-Carbide Samples

A sample test kit containing a variety of shapes and sizes of the new "Grade 608" cemented chromium carbide (described on page 172) is now available from the Carbolov Department of the General Electric Co., 11177 East 8 Mile Road, Detroit 32, Mich. This kit has been assembled to enable product designers, development engineers, process engineers, and metallurgists to make a wide variety of metallurgical, physical, and chemical tests in order to check the corrosion, abrasion, and erosion resistance of the new carbide in specific applications.

Unit for Separating Stacked Steel Sheets

A Caufield sheet steel separator for the removal of the top sheet of steel from a stack is being introduced by the Clark-Hopkins Equipment Corporation, 1124 Spring Garden St., Philadelphia 23, Pa. This separator is designed to eliminate time lost in trying to pry oily sheets apart with the hands or a sharp instrument. It always raises the top sheet about 2 inches above the balance of the stack. As each steel sheet is removed, the next one is raised and separated ready for immediate transfer to a press or machine.

Use of this automatic separator prevents damage to dies by eliminating the possibility of feeding double sheets into a press. The danger of the operator receiving severe cuts or bruised fingers is also greatly lessened. The separators are compact in size, and are used singly or in pairs. The four sizes now available are 6 1/2, 9, 10, and 15 inches.



"Spectrum" diamond lapping wheels marketed by Penn Scientific Products Co.

Lapping Wheels and Compounds

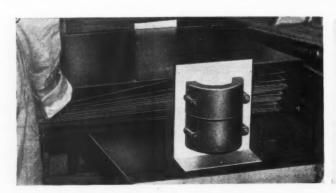
A new method of wheel lapping developed recently by the Penn Scientific Products Co., 5941 Alma St., Philadelphia 24, Pa., is claimed to increase the life of cutting tools. The "Spectrum" diamond lapping compound developed for this method is produced from pure virgin diamond and is available in any desired grit size. It is applied to special "Spectrum" lapping wheels which are made from materials that are said to retain their shape and wear indefinitely, and which are interchangeable on all tool grinders.

Inexpensive kits containing "Spectrum" diamond compound, lapping wheel, lapping oil, applicator, and wheel charging roller are now available. A wide variety of wheels and lapping compounds in twelve standard grit sizes can be purchased separately.

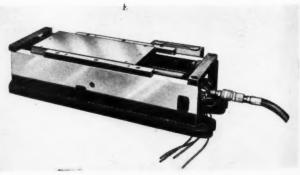
Bellows "Transfeed" Work Feeder

A two-station electrically controlled, air-powered work feeder designated the "Transfeed" is being added to the line of "Controlled-Air-Power" devices manufactured by the Bellows Co., 230 W. Market St., Akron 9, Ohio. The movable, mild steel table top of this feeder is 11/16 inch thick by 5 164 inches wide by 12 inches long, and is guided between hardened and ground dovetail ways. Power for the transverse motion of the table top is supplied by a special Bellows BEM 5-60 air motor with an "Electroaire" valve.

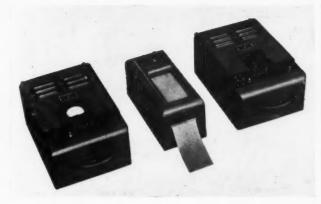
The work feeder has a 6-inch positioning stroke which allows the operator to load and unload work at one end of the table while work is being machined at the other end. Fixtures for holding the work may be mounted directly on the table top or on over-size table tops. The unit is equipped with adjustable positive stops, for

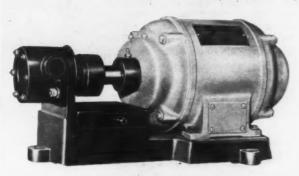


Separator for stacked steel sheets introduced by Clark-Hopkins Equipment Corporation



"Transfeed" two-station work feeder now being manufactured by the Bellows Co.





Welding analyzer introduced by Brush Development Co.

Jabsco impeller pump for handling corrosive liquids

accurate work positioning. This equipment is available as a completely packaged unit with built-in controls.

is utiaped om ail-It m' ide to inerrs. ng nd, oli-

ler ety

an

m-

ler

is

n-

ıu-

30

he

of

by

es

·d-

ys.

on

a 10-

ws ad

ile

he

ng

tly

ze

ed

or

Brush Welding Analyzer

A direct writing welding analyzer which records single-phase and three-phase resistance welding machine variables is being manufactured by the Brush Development Co., Instrument Division (42-E), 3405 Perkins Ave., Cleveland 14, Ohio. The welding current and the electrode force are measured and recorded simultaneously with this equipment which shows the important squeeze, weld, hold, and off time intervals.

The new analyzer also records the small 180-cycle per second component present in the three-phase welding machine current when ignitron rectifiers are used. The welding engineer can adjust the welding machine as the measurements are being made, due to the immediate availability of the information on the direct writing oscillograph.

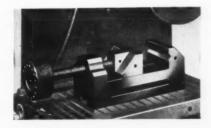
Ace Jabsco High-Capacity Pump for Handling Acids and Alkalies

The Ace Jabsco flexible neoprene impeller pump designed to deliver a large volume of liquid in proportion to its size is now available in hard rubber construction for handling acids, alkalies, and other corrosive liquids. Although this pump, manufactured by the American Hard Rubber Co., 93 Worth St., New York 13, N. Y., is only 3/4 inch in size, it has the capacity to deliver 15 gallons per minute at a head of 22 feet, or 5 gallons per minute at a head of 72 feet. The maximum capacities are 95 feet head or 16 gallons per minute. It will pump viscous or thin liquids, and is resistant to alkalies, solutions of metallic salts, inorganic acids, hydrochloric acid of any strength, and, in fact, any liquid that can be handled by neoprene, as the hard rubber casing generally is more resistant than the impeller.

Multi-Speed Transmission

One of three models of multi-speed power units for heavy horsepower applications announced by the Turner Machinery Co., 3408 Terrace St., Kansas City 8, Mo. Models 2004, 3004, and 5004 transmissions are available in ratings up to 60 H.P. The units are ideal for use wherever it is necessary to vary the turning speed of electrically driven equipment or machinery. While all units are available in four speeds with a selection of different ratios, some models can be supplied with six and nine speeds.



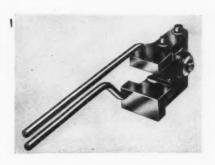


Erickson Precision Gage Vise

Precision gage vise which is accurate within 0.0003 inch on five surfaces, recently added to the line of precision holding tools manufactured by the Erickson Tools Division, Erickson Steel Co., Hamilton Ave., Cleveland 14, Ohio. This vise is designed to permit a series of accurate operations to be performed without removing the work from the vise. The gage vise can be used in combination with a sine plate for a wide variety of precision work. The jaw opening is 2 5/8 inches, and the body dimensions are 2 3/8 inches square by 6 inches long.

"Mijit" Drill Jig

Small size drill jig recently added to "Mijit" line made by the Esco Engineering Corporation, 1940 E. Woodbridge St., Detroit 7, Mich. Called the "Jr. Mijit" precision drill jig, this product is designed for the accurate drilling of extremely small parts. It is particularly adapted for use in the radio, television, electronics, small arms, instrument, and appliance industries. It is easily adapted to various size parts within its range up to 1 1/2 inches. All working parts, including posts, rack, and gear, are hardened



ana grouna to close limits. The shut height is infinitely variable from 1 inch to 1 1/2 inches. The working area is 1 inch by 1 1/8 inches. The jig base is 1 11/16 by 2 11/16 inches, and stands 2 1/4 inches high.

Air-Operated Bench Vise

High-powered, air-operated bench vise with power ratio of 100 to 1. Power is furnished by a compact cylinder with an 8-inch bore and two pistons separated by a removable cylinder head. The cylinders are single-acting, incorporating a fully enclosed spring return. The piston and vise jaw have a stroke range of from 0 to 1 3/8 inches



that is controlled by a positive safety stop-screw. The jaws are 6 inches wide and have a maximum opening of 10 inches. Available with stationary or swivel base. A combination machinist and pipe vise model is also available. Made by Van Products Co., 3734 W. 12th St., Erie, Pa.

General Electric Tachometer Kit

Units of one of a line of tachometer kits, containing all the components necessary to provide instantaneous and permanent records of machine performance at a central location, announced by the Meter and Instrument Department of the General Electric Co., Schenectady 5, N. Y. Central location of this recording equipment serves to

eliminate time-consuming productionline trips by supervisory personnel and permits up-to-the-minute checking of operating equipment. Permanent recording feature aids preventive maintenance scheduling, and avoids excessive manufacturing losses by automatically shutting down machinery in case of breakdowns.



Automatic Air-Control Valve

Automatic air-control valve for use with air suction systems and dust collectors on units such as metal grinding and polishing machines, wood jointers,



p'aners, sanders, etc. Several unusual features are claimed by the manufacturer for this product, which is to be known as the "Ventomatic" air control valve. The unit can be fitted to any machine, pipe, or installation within its size range. The valve opens and closes automatically as the machine switch is turned on and off, and thus prevents the continual exhausting of warm air. Sizes are available to fit 3- to 8-inch ducts. Product of the Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.

Electro-Mechanical Punch Press Stop

Electro-mechanical punch press stop called the "Presstop," just announced by the Brinnell Co., Simsbury, Conn. This device ho'ds down the treadle or hand-lever of a punch press electrically and releases it instantly when the operator pushes a conveniently located stop-button. When the operator engages the mechanical clutch, a solenoid in the "Presstop" is energized, automatically engaging a latch that holds down the treadle or lever for continuous press operation. The stop-button de-energizes the solenoid, releases the holding latch, and allows the clutch to disengage. A special cutout switch can be used to permit single-stroke operation.



"Sterilshield" Dust- and Germ-Free Work Bench

The :

for in

certa

Cinc

mov

accu

nece

It is

lowe

cont

Wri

B-3,

Dust- and germ-free work bench of redesigned line manufactured by the Baker Co., Maplewood, Me. benches have a central air cleaning unit using electrostatic dust-collecting equipment and a blower to pressurize up to four work space sections which may be arranged in any order on either the right- or left-hand side of the cleaning unit. The work space sections are of 14 gage stainless, non-magnetic steel formed as a pan for the enclosed bench top. Dual 30-watt fluorescent lamps provide ample illumination for the 24- by 40-inch bench. Vision is unrestricted through a plate glass window in the hinged sloping front which may be raised to admit large work. Automatic switches start the cleaning unit and blower whenever any cabinet is open for use, and ultraviolet lamps are added when it is desired to kill airborne bacteria.





THE CINCINNATI SHAPER CO.

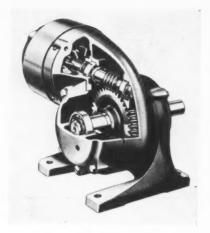
CINCINNATI 25, OHIO, U.S.A.

B-3, or consult our Engineering Department.

SHAPERS . SHEARS . BRAKES

Livestock Shelter

Dairy Building



Automatic Oiler for Air Pumps

Oiler developed to automatically feed measured amounts of oil to air pumps, manufactured by Leiman Bros., Inc., 146 Christie St., Newark 5, N. J. This oiler provides adequate lubrication of wings and vanes, yet enables the pump to deliver air which is virtually oil-free for use in printing and other operations requiring extremely low oil vapor content. It replaces manual oilers, eliminates the human element, and will feed any oil from SAE 10 to SAE 70. The rate of feed is quickly adjusted from



Right-Angle Worm-Gear Motor

Low-speed right-angle worm-gear motor of new line placed in production by U. S. Electrical Motors, Inc., Box 2058, Los Angeles 54, Calif. This Type GW "Syncrogear" unit is said to have numerous features not previously available in low-speed motors. A cantilever design protects gear alignment, and mounting stresses are absorbed by a rugged single-unit base. It embodies splash lubrication, hardened and ground worm, leakproof oil seal, asbestos-protected windings, and self-locking brake. Built in speed ranges from 20 to 155 R.P.M., gear ratios up to 58 to 1, and a range of from 1/4 to 3 H.P. in three-phase and single-phase models.



one drop in four minutes to four drops in one minute. The transparent reservoir, hinged for easy refilling, holds 3 ounces of lubricant.

thread ring gages designed for volume gaging of identically sized threads brought out by the Hanson-Whitney Company, Hartford 2, Conn. Because of the extreme hardness and wear resistance of the inserted carbide thread segments, the ring gages will maintain their initial accuracy over extended periods of time and through continuous use. They can be reserviced and may be used as master or reference rings.

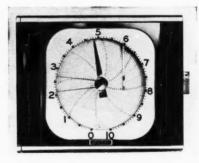
Thread Ring Gage

One of a complete line of carbide

Machine for Rapid Copying of Any Size Office Form

Desk-side machine known as the "Copyflex" Model 14 designed to copy, in seconds, any size office form. Virtually automatic in operation, this machine makes low-cost, error- and smudge-proof, positive copies of practically anything typed, written, printed,

It has a large copying width-20 inches-enabling it to copy even the larger size accounting and statistical sheets, or ordinary letter-size forms two at a time. Product of Charles Bruning Co., Inc., 125 North St., Teterboro, N. J.

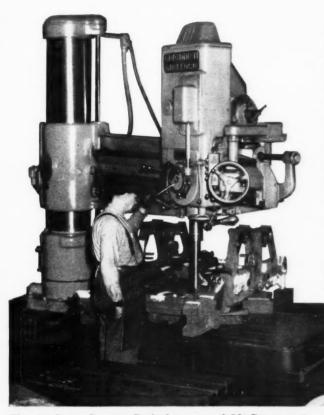


Bristol Round-Chart Recorder for Electronic "Dynamaster" Line

The Bristol Co., Waterbury 20, Conn., has announced the addition of roundchart recorders and automatic con-trollers to its line of electronic "Dynamaster" potentiometers and bridge instruments. The new round-chart "Dynamaster" models have been developed to provide accurate, high-speed, continuous balance, null type electronic instruments which can be used to measure any variable that can be translated into an electrical quantity, such as direct current, voltage, capacitance, or resistance. Typical "sensing" elements that can be used with these new instruments include thermocouples, radiation detecting units, resistance thermometer bulbs, pH amplifiers, tachometer magnetos, strain gages, smoke density detectors, thermal converters for power measurements, beta ray gages, and many The measured variable is sim-



BAY CITY SHOVELS, INC. BOUGHT... low upkeep...ease of handling...increased production



This 7' Super-Service Radial is one of 10 Cincinnati Bickford drilling machines at Bay City Shovels, Inc.

Castings 4' wide by 10' long, and weighing up to 3800 lbs., are handled on this job—65 holes are drilled on one set-up, with .003" tolerances.

The ease of handling of this Super-Service Radial, its accuracy, power and operator convenience have increased production on these power crane and shovel revolving bases. Floor to floor time cut from $6\frac{1}{2}$ hours to $4\frac{1}{4}$ hours.

Bay City Shovels, Inc., states the upkeep on this drill has been low.

It is another example of a fine tool working on a fine product.

Write for Bulletin R-29, or consult our Engineering Department. Your drilling problems are our problems.



41/64", 1/4" and 1-61/64" diameter holes are being drilled in this illustration



Shovels, Inc.



THE CINCINNATI BICKFORD TOOL CO. cincinnati 9. Ohio U.S.A.

ultaneously recorded on a 12-inch diameter chart and indicated on a large circular scale which is legible at a distance.

Toolmakers' Parallel Clamps

Toolmakers' parallel clamp available in sizes with openings ranging from 5/8 inch to 3 1/2 inches announced by Precision T. C. Co., Department 6,



1305 S. Laramie Ave., Cicero 50, III. These clamps are hardened throughout, and have metal clips to retain screw.

"Burgmaster" Tapper

The Burg Tool Mfg. Co., 3743 Durango Ave., Los Angeles 34, Calif., has just announced the introduction of the "Burgmaster" tapper. This is a heavy-duty tapper with a range for tapping threads from No. 10 to 1/2-inch National Fine series using two sizes of collets. The positive drive assures accurate threads and can be easily changed from right- to left-hand tapping. All the gears are constructed of



alloy steel, hardened and ground. The taps are centered and held securely by rubber-flex tap chucks and are driven through a tang drive.



Pilot Check Valves

Pilot check valve designed to lock a cylinder or part of a circuit without leakage. This valve is especially adapted for use on hydraulic clamping devices, where a slight leakage would cause loss of the clamping pressure. Product of Fluid Contro's, Inc., Box 186, Willoughby, Ohio.

Flexible Coupling

One of a line of standard bore couplings for "Cone-Drive" worm shafts, gear shafts, and electric motor shafts announced by the Cone-Drive Gears Division, Michigan Tool Co., 7171 E McNichols Road, Detroit 12, Mich. This gear type flexible coupling has



seven parts: a sleeve, two hubs, two neoprene seals, and two snap rings. The hubs and sleeve are SAE 1045 steel forgings having a tensile strength of 90,000 pounds per square inch. The couplings allow an average of 3 degrees angular misalignment and 1/16 inch offset, depending on size. The standard couplings are made in twenty-two bore sizes from 3/4 inch to 6 1/2 inches in diameter, with capacities from 4 to 550 H. P.



Modernair Air-Hydraulic Cylinder

Air-hydraulic cylinder for actuating industrial pressure-operated devices, available from the Modernair Corporation, San Leandro, Calif., in two bore sizes of 2 and 3 inches. Interchangeable mounting brackets, shown in the illustration, provide versatility of mounting. Standard shop air-line pressure is utilized to actuate the cylinder, while the built-in hydraulic system furnishes positive regulation of forward or reverse stroke movement by adjustment of speed control. The cylinder is adapted for powering tools or work in machining operations, to permit rapid traverse (if skip feed by-pass is used) and finely controlled movement during work stroke and quick reversal.



Weather-Proof Switch

Compact, weather- and oil-proof pushbutton electric switch announced by Micro Switch, Division of Minneapolis-Honeywell Regulator Co., Freeport, III. This switch weighs only 1 ounce and is of the double-pole, double-throw assembly type. It is listed by Underwriters' Laboratories in both single- and doublepole switch assemblies for 5-ampere 250-volt alternating current, and for control of 30-volt direct-current inductive loads of 2 amperes at sea level, and 1 1/2 amperes at an elevation of 50,000 feet. Installation and wiring are facilitated by provisions for quick removal and replacement of switch elements in mounting brackets.



The Olive Pit

Upon requesting a short autobiographical sketch of a man who was making news in our industry, in which he was to mention his hobbies, he replied: "One of my hobbies is organic chemistry where I have done considerable research with Juniper extract as a preservative for fruits such as olives." Now would this be a dry reference to Martinis? Very dry, thank you.

The Machinist's Nostalgia

One of our Canadian subscribers—Cecil H. Smith of Galt, Ontario—writes to us: "Do you remember when we didn't have high-speed tools, all forged tools, no tool-holders? No compound rest on the lathe. No hole through the spindle. A square on the tail center so you could get it out with a monkey wrench. No center drills or electric drills. No mikes. No cold-rolled, all-turned shafting. No grinders to speak of. Where your finishing cut with water dripping on the work from a can was at least

'8 threads per inch.' When the bore of a locomotive wheel was calipered, the dimension transferred to outside calipers for use in turning the axle and the axle had to be pressed in at so many tons, and a record was kept. When the swing of the calipers in a hole machined for a running fit was 3/4 inch per foot of hole diameter and you obtained the same result as when tables are followed that give clearances in thousandths. When a piece of lead was made to look like a center punch and given to a tool dresser to harden. When apprentices got 4 cents per hour their first year and had to sweep the floor and wash the woodwork as part of their training."

Must Repose, Can Compose

While our English contributor, W. M. Halliday, was playing cricket in the garden with his young son, he had the bad luck to slip "attempting a hit" and gave his right ankle "a devil of a sprain." Turned out to be a

double fracture, and he tells us that his right leg and foot have been in plaster for several weeks now. Having more than just spare time on his hands, perhaps our convalescent writer will manage more articles than usual for MACHINERY'S Ingenious Mechanisms Department.

The Best Twisters Are The First Twisters

The Oklahoma Institute of Technology is making a study of communication within organizations—dependent on length and difficulty of message, number of people involved, etc. One conclusion reached so far is that the greatest amount of distortion in a communication occurs with the first two people relaying the message.

Blaming the Barber

Reading the four causes of "barber pole" finish (a grinding fault) on ground cylindrical work, we were surprised that "chatter" was not one of them.

New Member of MACHINERY'S Fifty-Year Club—C. ROBERT LIBBY has subscribed for half a century, and tells us that he has always looked foward to each issue—even when his positions didn't tie in too closely with the mechanical field. But mostly they did, it would seem, from a review of his various connections—chief draftsman with the Lamson Consolidated Store Service Co. (now the Lamson Co. of Syracuse), designer of special gages during World



War I with the Greenfield Tap & Die Corporation, then of jigs and fixtures with the American Bosch Co., and so on. Mr. Libby was born in Chelsea, Mass., in 1881, and studied at Lowell, Mass., schools. Since 1938, he has been with the Procter & Gamble Co. in Ivorydale, Ohio. Mr. Libby finds enjoyment in reading technical magazines, in doing mathematics problems, and in taking his family for spins around and away from his Cincinnati homestead.

News

California

STERLING ELECTRIC MOTORS INC., Los Angeles, Calif., has announced the appointment of the following distributors: Alex Borders Machinery Co., 3724 First Avenue North, Birmingham 6, Ala.; Industrial Dairy Supplies, Inc., Buck and Pine Sts., Millville, N. J.; Prussack Electric Co., 1817 Pitkin Ave., Brooklyn 12, N. Y.; Petro-Chemical Equipment Co., Inc., 2438 South Blvd., Houston 5, Tex.; and Elm Electric Supply Co., 49 Elm St., Stamford, Conn.

T. D. Davis, western branch manager of the Crusher and Process Machinery Divisions of the Nordberg Mfg. Co., Milwaukee, Wis., has been placed in charge of the company's entire West Coast operations. Mr. Davis will retain his headquarters at the San Francisco, Calif., office.

ESCO ENGINEERING CORPORATION, Detroit, Mich., announces the appointment of M. C. CRAWFORD Co., 2521 W. Slauson, Los Angeles 43, Calif., as representative for the Esco line of standard and Mijit drill jigs in southern California and Arizona.

Tocco Division of the Ohio Crankshaft Co., Cleveland, Ohio, announces the opening of a West Coast office, located at 3349 Union Pacific Ave., Los Angeles 23, Calif. Harlan A Messner will manage the office.





(Left) B. A. Gustafson, vice-president of the Sundstrand Machine Tool Co.; and (Right) Edgar O. Landstrom, secretary

Illinois and Missouri

GEORGE J. EARL has been named commissioner of the National Metal Trades Association, Chicago, Ill., succeeding Homer D. Sayre who recently retired from that post, which he occupied for twenty-nine years. Mr. Earl has served with the Association for the last twenty-three years and was assistant commissioner prior to his promotion.

The former Wheelco Instruments Co. of Chicago, Ill., which is now the Wheelco Instruments Division of Barber-Colman Co., Rockford, Ill., announces that all manufacturing and operating facilities have been transferred to Rockford.

E-Z WAY TOOL Co., Chicago, Ill., manufacturer of the E-Z Way electric hacksaw, has been purchased by the Burpee Can Sealer Co., Barrington, Ill. All manufacturing operations for the hacksaw have been transferred to the Burpee plant.

B. A. Gustafson, manager of the Machine Tool Division of the Sundstrand Machine Tool Co., Rockford, Ill., has been appointed vice-president. He has been with the company since 1933. Also announced was the appointment of Edgar O. Landstrom as secretary of the company. Mr. Landstrom was formerly manager of the Pneumatic Products Division.



MOF

for t

are:

B16-

pro

ma

of:

yea

pu

Su

ab

tio

eff

for

ma pe

or

mi

er

M

op

he

S

Weaver E. Falberg, new manager of the All y Steel Division of Joseph T. Ryerson & Son, Inc.

Weaver E. Falberg, assistant manager of the Alloy Steel Division of Joseph T. Ryerson & Son, Inc., Chicago, Ill., steel distributors, has been promoted to the position of manager of the division. In taking over this position, Mr. Falberg replaces John W. Queen, who has been given special administrative duties. This division, responsible for coordinating nation-wide alloy steel sales, has its headquarters in Chicago.

ILLINOIS TOOL WORKS, Chicago, Ill., announces the election of three new vice-presidents: Austin E. Cole, vice-president and treasurer; J. B. O'Connor, vice-president and manager of new product development; and ROBERT F. DICK, vice-president and assistant to the president.

PARKER APPLIANCE Co., Cleveland, Ohio, announces the appointment of the Rockford Tool & Transmission Co., 802 Broadway, Rockford, Ill., as distributor for its line of industrial tube fittings and related accessories.

POWDERED METAL PRODUCTS CORPO-RATION OF AMERICA, Franklin Park, Ill., has announced the availability of production facilities for precision castings made by the shell molding process.

Tocco Division of the Ohio Crankshaft Co., Cleveland, Ohio, recently



MORE THAN 300 PARTS ARE MACHINED with the aid of one cutting oil for tools and hardware items made by Sargent & Co. Raw materials worked are: B1113 steel, 11ST-3 aluminum, ASTM-B140-46 Type B half-hard bronze, B16-46 brass, and Type 416 stainless steel. Stock ranges from 1/16" wire to 2" bars.

SINGLE GRADE OF SUNICUT REPLACES 4 CUTTING OILS

A good example of cutting-oil economy and efficiency is provided by Sargent & Co., well-known hardware and tool manufacturers. Their complete line requires the machining of more than 300 parts from a wide range of metals. A few years ago this company was using four different cutting oils, purchased in drums. By switching to a single product, Sunicut 11W, and buying it in bulk, Sargent has been able to effect an annual saving of about \$3,000. All operations are performed as well as before, or better-and shop efficiency is up.

Sunicut 11W is a low-viscosity, dual-purpose cutting oil for automatics machining all nonferrous metals and freemachining steels such as B1112 or B1113. Its transparency permits quick and accurate miking. It will not stain brass or copper under normal conditions. It drains rapidly, minimizing carry-off. And its high lubricating and cooling properties aid in prolonging tool life and improving finishes. Moreover, it protects finished parts from rust and corrosion.

Other Sun cutting oils offer similar opportunities for improved operations and economy. For information about them, or the help of a Sun representative, use the coupon at the right.

SUN INDUSTRIAL PRODUCTS SBN OIL COMPANY, PHILADELPHIA 3, PA. . SUN OIL COMPANY, LTD., TORONTO & MONTREAL





LOCK CYLINDER, Metal: 13/8" dia. brass · Machine: model 601 New Britain Gridley · Operations: crossslide—rough form, finish form, break down cut off, side mill, vertical end mill, final cut off; tool slide—face, drill offset hole, ream and counterbore offset hole, thread
• Spindle Speed: 1,324 rpm • Feed: .006" per revolution . Tools: high-speed steel . Cycle Time: 7.3 seconds



CARPENTER'S PLANE PART, Metal: %"
B1113 steel • Machine: Brown & Sharp Automatic Screw Machine • Operations: front cross slide—form; rear cross slide—cut off; turret—feed stock, spot drill, drill 13/2" hole, tap drill, reverse spindle and tap left-hand thread • Spindle Speed: 1,180 rpm • Feed: .0025" per revolution . Tools: high-speed steel . Cycle



KNOB INSERT. Metal: 11/16" round aluminum

• Machine: model 61 11/8" New Britain Gridley • Operations: cross slide—form, knurl, cut off; tool slide—spot drill, tap, ream, recess • Spindle Speed: 1,600 rpm • Feed: .005" per revolution • Tools: high-speed steel • Cycle Time: 7 seconds

SUN OIL	COMPANY,	Dept.	M-8.
Philadelphia	3, Pa.		

I am having trouble possibly caused by an inadequate cutting oil. I would like the serv-

"Cutting and	n representative; d Grinding Facts."	the booklet
Name		
Title		
Company_		
Street		
City	Zone	State

announced the removal of its Chicago office to larger quarters at 6600 S. Nashville Ave., Chicago, Ill.

GROTNES MACHINE WORKS, INC., recently moved from 2111 W. Lake St. to 5454 N. Wolcott Ave., Chicago 40, Ill.

JOSEPH T. RYERSON & SON, INC., Chicago, Ill., steel distributors, recently held an open house at the enlarged St. Louis, Mo., plant. The addition, which was begun last year, provides 50,000 square feet more warehouse space to the plant.

Michigan and Wisconsin

CABROLOY DEPARTMENT OF GENERAL ELECTRIC Co., Detroit, Mich., has appointed the following distributors: ACME SAW & SUPPLY Co., 2745 Kettner Blvd., San Diego 1, Calif.; and SQUIER, SCHILLING, & SKIFF, INC., 415 Plane St., Newark 2, N. J. Also announced was the appointment of two district managers: V. H. DEARLE, manager of the Michigan District. with headquarters at 11177 East 8 Mile Road, Detroit, Mich.; and E. R. ALMDALE, manager of the Atlantic District, with headquarters at 1060 Broad St., Newark 2, N. J. Mr. Almdale succeeds P. H. Holton, who is retiring. Joining the company in the capacity of Alnico specialist is ROBERT GRORUD, who was formerly associated with the Pyle National Co.

ROBERT L. BREHM has been advanced to the position of assistant chief engineer of the Snyder Tool & Engineering Co., Detroit, Mich., and its subsidiary, Arthur Colton Co. RICHARD T. JOHNSTONE has been appointed chief draftsman of the company, while ELWOOD M. KEIFER has been made sales engineer.

ARCH MORTON has resumed active management as head of the Morton Machine Works, Ferndale, Mich., after a year's absence. PAUL W. Taylor is joining the company in the capacity of manager.

CARL S. ABBOTT has been appointed vice-president and general manager of the J. N. Fauver Co., Inc., Detroit, Mich., and John W. Fauver, vice-president and sales manager.

REDFORD STAMPING Co., Inc., Detroit, Mich., manufacturer of small light metal stampings, announces the change of the company's name to Elcar Industries, Inc.

ALLIS HYDRAULIC PRODUCTS, INC., has been organized to design and build air and hydraulic cylinders to customers' specifications. The company is located at 1721 E. Lake Bluff Blvd., Milwaukee, Wis. WILLIAM W. ALLIS is president and general manager, while G. A. MARKUSON is vice-president and sales manager.

PHOENIX PRODUCTS Co., Milwaukee, Wis., announces the purchase of a welding line—the DryRod electrode oven, formerly sold by PHILIP RODEN Co., also of Milwaukee.



W. O. MECKLEY has been made manager of engineering, and H. M. Wales, manager of sales, for the newly formed Accessory Turbine Organization at the Lynn River Works, Lynn, Mass., of the General Electric Co. Other appointments were as follows: T. N. FERREN, superintendent of manufacturing; F. W. Dahlerg, facilities engineer; J. W. Shirley, production manager; and A. C. Eastman, inspection supervisor.



Charles R. Crowder, newly appointed executive vice-president of the Van Norman Co.

CHARLES R. CROWDER has been appointed executive vice-president of the Van Norman Co., Springfield, Mass. Mr. Crowder has been with the company for the past twenty-four years, and was successively sales promotion manager, sales manager, and vice-president and director of sales of the Automotive Division. In his new position he will be in charge of all manufacturing activities—automotive service equipment, and milling and grinding machines.

FRANK E. COLESWORTHY, purchasing agent for Crompton & Knowles Loom Works, Worcester, Mass., is retiring after fifty-three years of service in the company. He is succeeded by John H. Johnson, who was assistant purchasing agent at the time of his promotion.







(Left) Robert L. Brehm, newly appointed assistant chief engineer of the Snyder Tool & Engineering Co. (Center) Richard T. Johnstone, chief draftsman; and (Right) Elwood M. Keifer, sales engineer







(Left and Center) Douglas T. Hamilton and Leroy C. King, retiring publicity and sales managers, respectively, of the Fellows Gear Shaper Co.; and (Right) George H. Sanborn, new sales manager

REED ROLLED THREAD DIE Co., Worcester, Mass., announces the reversal of position of the following men: Joseph S. Seville, formerly chief engineer, is now superintendent, and George W. Lyman, formerly superintendent, is chief engineer.

STANLEY C. JOHNSON has become chief abrasive inspector for the Norton Co., Worcester, Mass., replacing HARRY O. ANDERSON, who recently retired after serving the company for fifty-one years.

VEEDER-ROOT, INC.. Hartford, Conn., manufacturer of counting devices, recently honored Thomas J. Leemon, Adolph Selnau, and Arthur E. Kallinich, employes with forty years or more of service in the company. Mr. Kallinich, who is a vice-president of the company, was associated with the Root Co. in Bristol, Conn., when that concern merged with Veeder Mfg. Co. in 1912.

CHESTER M. ADAMS has become general sales manager for the Bridgeport Brass Co., Bridgeport, Conn. George H. Baldwin, formerly sales manager of mill products has been made assistant general sales manager, while Richard L. Allen has been appointed sales manager of mill products for both the Bridgeport, Conn., and Indianapolis, Ind., plants of the company.

Carl H. Cummings, formerly sales manager, has been promoted to the position of general manager of the Haydon Mfg. Co., Torrington, Conn., manufacturer of synchronous motors and timing devices. Mr. Cummings succeeds Arnold J. Wilson, Jr., who has resigned to enter another field. E. B. Hamlin, who was sales supervisor at Haydon, has been appointed sales manager.

DOUGLAS T. HAMILTON, publicity manager of the Fellows Gear Shaper Co., Springfield, Vt., recently retired after serving thirty-five years in that capacity with the company. HENRY B. FLINN, who was assistant publicity manager, has been promoted to the position vacated by Mr. Hamilton. Also announced was the retirement of LEROY C. KING, sales manager, who had been in service and sales work for the company for the past forty-one years. George H. SAN-BORN was named sales manager to succeed Mr. King. Mr. Sanborn was Detroit district manager and chief field manager at the time of his appointment.

New York and New Jersey

EDWARD B. BLANC has been appointed sales engineer for the Drill Steel Division of the Crucible Steel Company of America, New York City. Mr. Blanc was formerly in the Boston office of the company; from his headquarters in Pittsburgh, Pa., he will now serve customers in the eastern half of the country. Another appointment made by the company was that of A. B. Wells, to the position of assistant manager of the Atlanta, Ga., sales branch.

CARL A. SALMONSEN, general manager of the industry control department of the General Electric Co., Schenectady, N. Y., has also been named acting general manager of the control department, replacing KARL R. VANTASSEL, who was recently appointed general manager of the Knolls Atomic Power Laboratory—operating department.

RUSSELL, BURDSALL & WARD BOLT AND NUT Co., Port Chester, N. Y., an-

nounces the following appointments: WILLIAM U. CIGLIANO. assistant general manager; Russell Hoehl, assistant district manager, with headquarters in Philadelphia; and Vernon Paulson, assistant western sales manager with headquarters located in Chicago.

DOALL EASTERN Co., INC., New York City, was recently appointed sales and service representative for the complete line of Sheldon machine tools, including tool-room precision lathes, a horizontal milling machine, and a 12-inch back-geared shaper.

HARTFORD SPECIAL MACHINERY Co., Hartford, Conn., announces the appointment of a representative in the Rochester, Syracuse, and Schenectady areas of New York State— MACAULAY MACHINERY Co., INC., 1978 Albany St., Schenectady, N. Y.

CHARLES H. SHIRO has been elected vice-president in charge of the Pig Iron and Oil Field Tubular Goods and Equipment Divisions of Kurt Orban Co., Inc., New York City, importer of metals, machine tools, and industrial equipment. Mr. Shiro was a sales engineer for the company.

RIGIDIZED METALS CORPORATION, Buffalo, N. Y., recently announced an engineering service by which the corporation will work with client design engineers in the preparation of special metal patterns to fill a precise end use.

PAUL L. WRIGHT has been appointed manager of the Buffalo, N. Y., plant of Joseph T. Ryerson & Son, Inc., Chicago, Ill. Mr. Wright succeeds Clarence S. Gedney, manager for the last twenty-three years, who is retiring.



Paul G. Mayer, assistant to the vice-president in charge of sales for Hydropress, Inc.

Paul G. Mayer has been made assistant to the vice-president in charge of sales for Hydropress, Inc., New York City. Mr. Mayer has been active in the engineering, project, and sales divisions of the company for over seventeen years. Also announced was the appointment of Ernest E. Kugel to the position of director of sales in charge of rolling mills.

DR. HILDING V. TORNEBOHM, vicepresident and technical director of SKF Industries, Gothenburg, Sweden, was elected president of the International Organization for Standardization at the recent meeting of the Organization held at Columbia University, New York City. Dr. Tornebohm, a pioneer in Swedish and international standards work,



Dr. Hilding V. Tornebohm, newly elected president of the ISO

was president of the Swedish Standards Association from 1941 to 1949, and at the present time is chairman of its ball bearing and screw threads committees.

HERBERT SCHWARTZ, assistant to the general manager of the Daco Machine & Tool Co., Brooklyn, N. Y., has been promoted to the position of production manager.

HELMUT THIELSCH has joined the Eutectic Welding Alloys Corporation, Flushing, N. Y., in the capacity of director of applied welding engineering.

ROBERT E. SIBLEY, sales and advertising manager of Leiman Bros., Inc., Newark, N. J., manufacturers of air pumps, sandblasting, polishing, and dust collecting equipment, recently retired. Mr. Sibley had been with the company for forty-five years—holding the above sales post during the entire period.

New York Belting and Packing Co., Passaic, N. J., has acquired the line of the L. H. Gilmer Co., Philadelphia, Pa., and will sell Gilmer products, including V-Belts, flat belts, timing belts, shock pads, etc.

Ohio

F. C. Teckmyer, Jr., has been appointed vice-president and general sales manager of the Ohio Gear Co., Cleveland, Ohio. Mr. Teckmyer has been with the company since 1939, and for the last two years has been general plant superintendent. Edward Beaumont who was assistant plant superintendent, has been promoted to the position vacated by Mr. Teckmyer. Joseph Stich has become assistant superintendent in Mr. Beaumont's stead.

K. C. Sheard has been appointed director for a new training program sponsored by the R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. Also announced was the appointment of C. J. Harter Machinery, of Houston, Dallas, and Fort Worth, Tex., as sales representative. B. N. Brockman, Jr., formerly with the R. K. LeB'ond Machine Tool Co. in Cincinnati, is now associated with the Harter concern.

Sub-Zero Products, Cincinnati, Ohio, manufacturers of industrial chilling machines, announces the appointment of the following representatives: Marshall & Huschart Machinery Co., Indianapolis, Ind.; Eernard E. Aldridge, Industrial Tool Associates, 4900 Madison St., Chicago, Ill.; Thermorite Corporation, 1110 Brentwood Blvd., St. Louis, Mo.; and L. Heres DeWyk & Co., 89 Main St., Ansonia, Conn.

C. B. Hunt & Son, Inc., Salem, Ohio, manufacturer of air and hydraulic control valves, announce the appointment of the following representatives: Circle Seal Supply Co., 2181 E. Foothill Blvd., Pasadena, Calif.; Process Equipment Co., 1663 Central St., Denver, Colo.; and Pollard & Co., S. 121 Madison St., Spokane, Wash.

RELIANCE ELECTRIC & ENGINEERING Co., Cleveland, Ohio, announces the promotion of the following men to new positions: James McCrea Biggar, Cleveland district; Burton B. Finigan, New York district; Walter A. Jensen, Buffalo district; and William C. Prettyman, Central Western district, at Chicago.

EUGENE F. ECKERLE, vice-president of Aluminum Industries, Inc., Cincinnati, Ohio, was elected general manager of the company. RICHARD G. TESSENDORF, sales manager of the original equipment division, was promoted to the position of assistant general manager in charge of manufacturing.

RAY A. MENTEL has joined the Republic Hardfacing Corporation, Bedford, Ohio, in the capacity of vice-president and general manager. Also, GORHAM W. WOODS has become associated with the corporation, as engineer in charge of the Industrial Hardfacing Division.

CHASE BRASS & COPPER Co., Waterbury, Conn., has begun construction of a new store and office building in Cleveland, Ohio. Located at Chester Ave. and E. 40th St., the building will occupy 39,000 square feet of space. It will be headquarters for the regional sales manager.

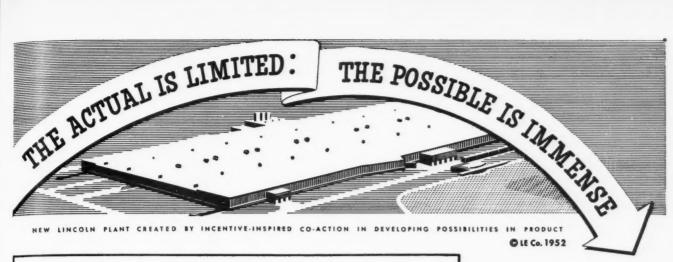
C. H. Rodgers & Co., Cincinnati representative of the Detroit Die Set Corporation, Detroit, Mich., has moved to new quarters at 4271 Harrison Ave., Cincinnati, Ohio.

JOHN A. GOODWIN has joined the Morrison Engineering Corporation, Cleveland 6, Ohio, in the capacity of general manager. Mr. Goodwin was formerly with the Chase Brass & Copper Co.

Bellows Co., Akron, Ohio, announces that it has acquired the sales rights for the Locke drilling and tapping unit.

Pennsylvania and Washington, D. C.

STANDARD PRESSED STEEL Co., Jenkintown, Pa., has named the following sales representatives: Marshel Moorhouse, New York City; Walter H. Cunnington, St. Louis, Mo., handling sales in the Midwest; and



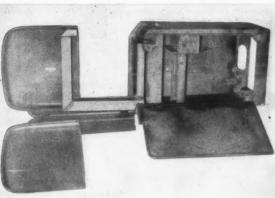


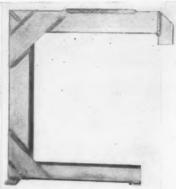
Fig. 4—All Welded Steel Frame for the Parks Woodworking Machine Co., Cincinnati, Obio. Sides are brake formed from 12 gauge metal.

Fig. 3 - Simple Jig for welding square steel tubing components consists of clamps and locating pads.

PROPER DESIGN IN WELDED STEEL ALWAYS IMPROVES PRODUCT, **LOWERS COST**



Fig. 1—Original Construction—Machine bracket formerly weighed 56 pounds, was difficult to cast, high cost incurred from excessive rejects.



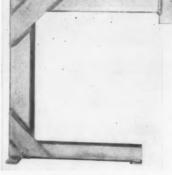


Fig. 2—Welded Steel Design is stronger, more rigid yet weighs only 35 pounds. Weldment costs 33% less than original casting. Eliminates considerable time in machining and assembly.

HERE'S MORE PROOF

MPROVES PERFORMANCE, CUTS COST 33% WELDED STEEL SIMPLIFIES CONSTRUCTION

Russell M. Roberts, Chief Engineer,

Parks Woodworking Machine Company, Cincinnati, Ohio

The original cast construction (Fig. 1) called for machining a to size, clamped in a plain fixture and butt welded. The efficient use The present welded steel design utilizes simple square tubing, sawed plified many production problems while cutting costs by one third. complicated casting on which foundry rejections were common. of steel has cut weight by 37% while increasing strength and rigidity. Changing over our band saw frame to welded steel design has sim-

An added benefit, made possible with welded design, now permits independent leveling could be accomplished only through a major adjustment of the work table that formerly of the frame itself

Complete training course for designers and production engineers now available for presentation in your plant. Send for complete details. TO DESIGN IN WELDED STEEL

Machine Design Sheets available on request. Designers and Engineers write on

INCOLN ELECTRIC COMPANY

Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

MACHINERY, August, 1952—251

James C. Humphries, Los Angeles, Calif., covering the Pacific Coast.

Waltham Grinding Wheel Co., Waltham, Mass., recently announced the appointment of the Parkway Supply Co. as Philadelphia distributor for the company. The distributor is located at 306 N. 17th St., Philadelphia 3, Pa.

ROBERT W. SUMAN has become chief engineer of the new Colmar, Pa., plant of the Link-Belt Co., Chicago, Ill. NORMAN VIRKLER succeeds Mr. Suman as chief engineer for the Philadelphia, Pa., plant.

James A. Currie has been made vice-president and general manager of the Erie Foundry Co., Erie, Pa., and Macdonald S. Reed has been appointed vice-president and chief engineer.

Penn Metal Co., Inc., Boston, Mass., announces the opening of an office at 1025 Connecticut Ave., N.W., Washington, D. C. Cecil R. Cooley is joining the company as district manager of the new office.

Texas and Colorado

CLECO DIVISION OF THE REED ROLLER BIT Co., Houston, Tex., has announced the appointment of the following distributors: OLIVER H. VAN HORN Co., 1742 St. Charles Ave., New Orleans 1, La.; BETHLEHEM SUPPLY Co., INC., Bethlehem, Pa.; and PEERLESS SUPPLY Co., INC., Shreveport, Lä.

CHICAGO PNEUMATIC TOOL Co., New York City, has begun construction of a new plant at Fort Worth, Tex., for the manufacture of oil well drilling equipment for the petroleum industry. The plant is scheduled for completion early in 1953.

DAVID W. JONES, JR., sales representative for the Tubular Products Division of the Babcock & Wilcox Co., Beaver Falls, Pa., has opened an office at 1321 Bannock St., Denver, Colo.

Canada

DETROIT DIE SET CORPORATION, Detroit, Mich., has appointed a distributor in Canada: Brown-Warrick Co., 1097 Cannon St., East, Hamilton, Ontario, Canada.



William L. Lewis

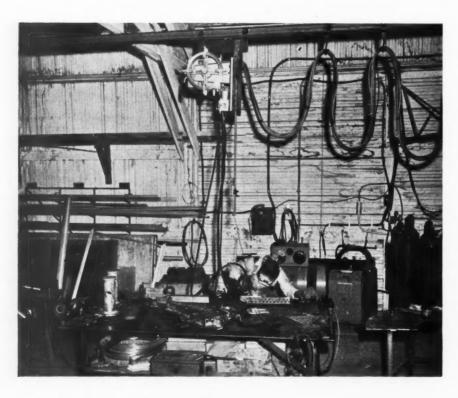
Obituary

William L. Lewis

William Luther Lewis. president of the Chicago Pneumatic Tool Co., New York City, died on June 28 at the Northern Westchester Hospital after an illness, at the age of sixty-eight years. Mr. Lewis resided at Briarcliff Manor, N. Y. A native of Wales, he came to this country as a boy, first working in Bridgeport, Ohio, for a lumber company. Later, he joined the Bethlehem Steel organization and rose to the position of assistant controller. In 1930, Mr. Lewis was elected vice-president, secretary, and treasurer of the Chicago Pneumatic Tool Co., and in 1946, president. Mr. Lewis was a brother of the late H. Edgar Lewis, former president and chairman of the board of the Jones & Laughlin Steel Corporation. He is survived by his widow and two sons.

* * *

More than 12,000 applications of precision gages are used in making the 5000 parts of a modern automobile.



By mounting Linde Air Products equipment for sigma (shielded inert-gas metal-arc) welding on overhead track, the production of aluminum window frames has been speeded up by sliding the equipment from one part of the shop to another. Also, wear of argon and water hoses, as well as welding cable, is practically eliminated.

WHO IS RESPONSIBLE

for the machine-tools in your shop?

- The dealer who sold them?
- The Engineering Company that designed them?
- The factory that built the machine, tool, or fixture?

Where can you get complete service and satisfaction?

With users of Microhoning equipment there is no possibility of divided responsibility. One organization sells, engineers, builds, and services the complete installation. Micromatic is proud to assume full responsibility for all equipment and the results obtained with the Microhoning process.

As the leader in the development of the honing process, Micromatic offers a complete line of equipment for processing all types and sizes of cylindrical and flat surfaces.

If your problem is production, precision, or costs let our organization of experienced engineers help you.



Write for issue of CROSS HATCH describing MICROHONING MACHINES



MICROHONING = STOCK REMOVAL + GEOMETRY + SIZE CONTROL + SURFACE FINISH

MICROMATIC HONE CORPORATION . 8100 Schoolcraft, Detroit 4, Michigan

MICROMATIC HONE CORP. MICRO-MOLD MFG. DIV. Boston Post Road Guilford, Connecticut MICROMATIC HONE CORP. 614 Empire Building 26 So. Main Street Rockford, Illinois

MICROMATIC HONE CORP. 1323 S. Santa Fe Avenue Los Angeles 21, California MICROMATIC HONE LTD. 55 George Street Brantford, Ontario, Canada MICROMATIC HONE CORP. MICRO-MOLD MFG. DIV. 231 So. Pendleton Avenue Pendleton, Indiana

REPRESENTATIVES: Overgard Machine Tool Company, 234 Commonwealth Bldg., Denver 2, Colorado Hallidie Machinery Co., 2726 First Ave., South; Seattle, Wash. • REPRESENTATIVES IN ALL PRINCIPAL COUNTRIES

New Books and Publications

METALLURGY FOR ENGINEERS. By John Wulff, Howard F. Taylor, and Amos J. Shaler. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 624 pages, 5 3/4 by 8 1/2 inches. Price, \$6.75.

Written primarily as a text-book for engineering students by three teachers of metallurgy at the Massachusetts Institute of Technology, this book can also serve as a selfteaching book for practicing engineers wishing to have an adequate understanding of metals or refresh their minds on metallurgical engineering. The first half of this book covers concepts and principles that underlie metal processing from ingots to finished articles of commerce; the second half deals with the processes themselves. The material is carefully arranged, and at the end of each chapter the reader will find a summary of important points covered in the chapter, definitions, a group of questions, and a list of references.

The subjects covered are indicated by the chapter headings: Introduction to Engineering Metals: Crystalline Structure and Properties of Metals; Solidification of Pure Metals; Impurity and Solubility; Phase Equilibrium and Alloy Systems; Alloy Systems of Limited Solid Solubility; Industrial Non-Ferrous Alloys; Alloys of Iron and Carbon: Heat-Treatment of Steel: Heat-Treating Steel; Methods for Determining Mechanical Properties of Metals; Mechanism of Deformation and Effects of Deformation of Metals; Electrical and Magnetic Properties of Metals: Corrosion: Introduction to Sand Casting Processes; Casting Processes Other than Sand Casting; The Ingot as a Casting; Melting, Heat Flow, Gases in Metals; Casting Defects, Inspection Methods, Casting Design; Gating and Risering; Powder Metallurgy; Welding; Arc-Welding Processes; Gas Welding, Thermit Welding, and Metallizing; Pressure Welding Processes; Brazing and Soldering; Metal-Working by Compression Processes; Stretching, Shearing, and Bending Processes; and Metal-Cutting.

PRACTICAL DESCRIPTIVE GEOMETRY. By
Hiram E. Grant. 253 pages, 6
by 9 inches; 339 illustrations.
Published by the McGraw-Hill
Book Co., Inc., 330 W. 42nd St.,
New York 36, N. Y. Price, \$4.

Instead of considering theory and practice as separate entities in the study of descriptive geometry, this text closely correlates and integrates

them. For example, a theoretical problem that would require that a line be drawn tangent to a given parabola is presented as a practical problem confronting the civil engineer—namely, that a parabola be drawn tangent to a given line. To assist the student to visualize space, reference planes are used instead of ground lines which represent only the edge view of the reference plane.

CORROSION TESTING PROCEDURES. By F. A. Champion. 369 pages, 5 1/2 by 8 1/2 inches; 77 illustrations and 27 tables. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, \$6.25.

The procedures described in this book will interest the investigator concerned with practical problems in the corrosion of metals in service and with the production of metal of adequate corrosion resistance. The text observes five distinct steps in corrosion testing procedure: (1) choice and preparation of the metal and corrosive; (2) exposure of the metal to the laboratory or field environment; (3) cleaning of the specimens preparatory to examining; (4) examination of the specimens and corrosive; and (5) expression and interpretation of results, with particular reference to the form of the corrosion time curve.

Coming Events

SEPTEMBER 8-10—THIRD NATIONAL STANDARDIZATION CONFERENCE sponsored by the American Standards Association in Chicago, Ill. Headquarters, Museum of Science and Industry. Further information can be obtained by writing to the Association at 70 E. 45th St., New York 17, N. Y.

SEPTEMBER 8-12—Seventh National Instrument Conference and Exhibit of the Instrument Society of America at the Public Auditorium, Cleveland, Ohio. For further information, address the Society, 1319 Allegheny Ave., Pittsburgh 33, Pa.

OCTOBER 20-24—NATIONAL METAL EXPOSITION AND CONGRESS at the Philadelphia Convention Hall, Philadelphia, Pa. Secretary, W. H. Eisenman, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

OCTOBER 26-29—Semi-annual meeting of the AMERICAN GEAR MANUFAC-

TURERS ASSOCIATION at the Edgewater Beach Hotel, Chicago, Ill. Executive Secretary, J. C. Sears, 302 Empire Bldg., Pittsburgh 22, Pa.

OCTOBER 29-31—FIFTH ANNUAL MACHINE TOOL CONFERENCE of the AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS at the Hotel Ten Eyck, Albany, N. Y. Additional information can be obtained by writing to J. M. Delfs, Chairman, A.I.E.E. Machine Tool Sub-committee, c/o General Electric Co., Schenectady 5, N. Y.

NOVEMBER 5-7—Sixteenth Annual Time and Motion Study and Management Clinic sponsored by the Industrial Management Society at the Sheraton Hotel, Chicago, Ill. Further information can be obtained by addressing the Society, 35 E. Wacker Drive, Chicago 1, Ill.

NOVEMBER 19—Thirty-fourth annual meeting of the American Standards Association at the Waldorf-Astoria in New York. Headquarters of Association, 70 E. 45th St., New York.

NOVEMBER 20-21—Seventh Mid-West Conference of the American Society for QUALITY CONTROL at the Claypool Hotel, Indianapolis, Ind. For further information, address Dale A. Cue, 5565 Brookville Road, Indianapolis, Ind.

DECEMBER 1-6—Twentieth National Exposition of Power and Mechanical Engineering at the Grand Central Palace, New York City, under the auspices of the American Society of Mechanical Engineers. Executive assistant secretary, Ernest Hartford, 29 West 39th St., New York 18, N. Y.

Two Leaflets Aid Small Producers

Two leaflets of interest to small manufacturers have been issued by the Small Defense Plants Administration. One of these, "Adequate Production Control," is prepared for the manufacturer whose firm is growing and who, sooner or later, will come to grips with the problem of production control.

The other leaflet, entitled "Sharpening of Drills, Lathe Tools, and Milling Cutters," gives technical information on the sharpening of tools to exact tolerances and the proper type of grinding equipment that should be employed for this work.

Copies of the leaflets are obtainable, without charge, from the field offices of the Small Defense Plants Administration or its Washington office. Small manufacturing firms desiring to obtain all of the leaflets as they are issued should request that their names be added to the mailing list now being compiled.

"We standardized on **SKIL** tools because they consistently out-performed all others!"

ive

MA-ER-IGI-

ny, can lfs.

ool ric

ual geus-

the

urby

cer

ıal

2D8

ria

SO-

est

TY

ool er

ue,

lis,

nal cal

ral

he

OF

rd,

ahe ng ne

nd

ls

at

ld ts

ts

says J. L. Pettit, plant manager, Metalwash Machinery Corporation, Elizabeth, New Jersey

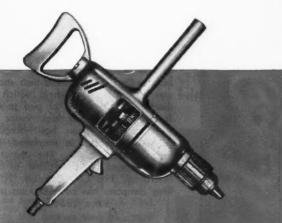
"The bulk of Metalwash Machinery Corporation's production of pickling, degreasing and drying machines now goes to defense industries," says Mr. Pettit. "Under present conditions," he continues, "we are working at full capacity on heavy machinery, work that asks the *most* of portable grinding and drilling tools.

"Years ago, we found SKIL tools out-performed other brands. Saved man hours through durable performance. Saved valuable materials through the most efficient operation and accurate performance of all the tools we tried!

"And," this plant manager observes, "we find it *far* easier to plan a production schedule when we *know* all drilling and grinding problems will be solved easily with SKIL tools because we've *proved* by experience they are *production* tools.

"It's easy to see why we've standardized on these rugged top quality tools."

Thomas Fitzsimmons uses a %" SKIL Drill with a 1" hole saw. He stresses, "SKIL Drills have plenty of guts. Drilling in steel hour after hour is a tough job, but these SKIL Drills deliver top performance, day after day!"



SKIL Drill Model 2103—Heavy duty %" drill. Capacity in steel: ½". Capacity in hardwood: ½" to 1½". No-load speed: 450 r.p.m. 1000 r.p.m. at extra cast. Full-load speed: 275 r.p.m. standard. Length over-all: 16½". Net weight: 14½ lbs.



See your distributor for complete information or call your nearest SKILSAW Factory Branch



SKIL Products are made only by SKILSAW, Inc. 5033 Elston Ave., Chicago 30, Illinois

SKILSAW Factory Branches in 34 Principal Cities. In Canada: Skiltools, Ltd., 3601 Dundas Street West, Toronto 9, Ontario

F. S. Blackall, Jr., Nominated for 1953 A.S.M.E. President

The nomination of Frederick S. Blackall, Jr., president and treasurer of the Taft-Peirce Mfg. Co., Woonsocket, R. I., as 1953 president of the American Society of Mechanical Engineers, has been announced by the Society. Mr. Blackall is currently president of the National Machine Tool Builders' Association.

The slate of nominees which Mr. Blackall heads, includes four regional vice-presidents and two directors-at-large, as submitted by the Society's nominating committee. Since only one name is presented for each office, nomination is tantamount to election. Election will take place in the fall by letter ballot of the membership.

Regional vice-presidents nominated are: Henry R. Kessler, manager, Republic Flow Meters Co., New York City; Paul R. Yopp. district sales manager, Babcock & Wilcox Co., Atlanta, Ga.; Ben George Elliott, professor of mechanical engineering, University of Wisconsin, Madison, Wis.; and Harry R. Pearson, personnel director, Dallas Power & Light Co., Dallas, Tex. Nominated as directors-at-large are: David W. R. Morgan, vice-president, Westinghouse Electric Corporation, Philadelphia, Pa.; and Ralph L. Goetzenberger, vice-president, Minneapolis-Honeywell Regulator Co., Washington, D. C.

Mr. Blackall joined the Taft-

Peirce Mfg. Co., makers of machinery and tools, in 1922. He became vice-president and general manager in 1929 and has been



Frederick S. Blackall, Jr., who has been nominated president of the A.S.M.E. for 1953

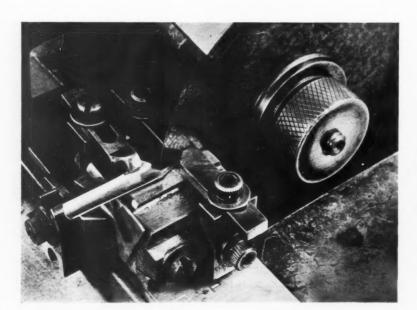
president and treasurer since 1933. He was graduated from Yale University in 1918 with a B.A. degree. In 1922 he received an S.B. degree from Massachusetts Institute of Technology.

King Machine Tool Celebrates Fifty Years

The Golden Anniversary of the King Machine Tool Division of American Steel Foundries, Cincinnati, Ohio, manufacturer of vertical boring and turning machines, is presently being cele-brated. Founded by Rufus King in 1901, the business was originally incorporated as the Wais-King Tool Co. Three years later, when E. A. Muller joined the organization as vice-president and general manager, the corporate name was changed to the King Machine Tool Co. and remained so until 1948, when the company was acquired by American Steel Foundries and became a division of the parent company. At the time of the acquisition, Charles F. Elmes, a vice-president of American Steel Foundries, became general manager of the King Division.

Since 1922, when a basic redesigning of the company's machines was achieved, King mills have been constantly improved and the range of sizes increased. The Division occupies an ultra-modern plant in Cincinnati.

In a period of about seventy years, the steel industry in the United States has increased its output by over 7500 per cent, and now houses almost one-half of the total steel-making capacity of the



The thinnest grinding wheel and one of the smallest ever made by the Norton Co. is this 3 1/2-inch diameter rubber-bonded wheel which is used to slit the nibs of pen points. It is only 0.006-inch thick—twice the width of a human hair! Regular Alundum abrasive is employed, the grit size being 240. The operation is performed in the plant of the Esterbrook Pen Co., Camden, N. J. This company has been making pens since 1858.

roduct Directory

To find headings easily, look for capital letters at top of each page to denote locations.

ABRASIVE CLOTH, Paper and Belt

Carborundum Co., Buffalo Ave., Niagara Falls, Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

ABRASIVE DISCS

S

10 f

of

1-

9-

g

S-

r,

r-

d e g

0 IS 1-

e f

el 1-

e.

ls d

ie

'n

e

2 d e e See Discs, Abrasive.

ABRASIVES, Polishing, Tumbling, Etc.

Carborundum Co., Buffalo Ave., Niagara Falls, N. Y. DoAll Co., 254 Laurel Ave., Des Plaines, III. Norton Co., I New Bond St., Worcester 6, Mass. Simonds Abrasive Co., Tacony and Fraley Sts.. Bridesburg, Philadelphia, Pa.

ACCUMULATORS, Hydraulic

ACCUMULATORS, Hydraulic

American Steel Foundries, Elmes Engineering
Div., Paddack Rd. and Tennessee Ave.,
Cincinnati, Ohio
Baldwin-Lima-Hamilton Corp., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Farquhar, A. B., Co., 21 Duke St., York, Pa.
Farquhar, A. B., Co., 21 Duke St., York, Pa.
Farquhar, A. B., Co., 21 Duke St., Strokelphia, Pa.
Greer Hydraulics, Inc., 452 18th St., Brooklyn
15, N. Y.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y.
Lake Frie Fnara, Corp. Keepman Star, Parkelphia Lake Erie Engrg. Corp., Kenmore Sta., Buffalo, N. Y. Morgan Engineering Co., Alllance, Ohio. Watson-Stillman Co., Roselle, N. J. Williams, White & Co., Moline, III.

AIR HOISTS-See Hoists, Air.

AIR TOOLS—See Grinders, Pneumatic; Drills, Portable Pneumatic, Etc.

ALLOY-STEELS

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bldg.,
New York, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport Pa Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
Republic Steel Corp., Union Drawn Steel Div., Republic Bldg., Cleveland, Ohio.
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.
U. S. Steel Corp., Carnegie-Illinois Steel Corp. Div., 436 7th Ave., Pittsburgh, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

ALLOYS, Aluminum

Aluminum Co. of America, Oliver Bldg., Pitts-burgh, Pa.

ALLOYS, Magnesium

Dow Chemical Co., Midland, Mich.

ALLOYS, Non-Ferrous

American Brass Co., 25 Broadway, New York. Chase Brass & Copper Co., Inc., 1949 Rodney St., Waterbury 20, Conn.. Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y. Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

ARBOR PRESSES

See Presses, Arbor.

ARBORS AND MANDRELS

ARBORS AND MANDRELS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., 1242 E. 49th St.,
Cleveland, Ohio.
Danly Machine Specialties, Inc., 2107 S. 52nd
Ave., Chicago 50, Ill.
Erickson Tools Div. Erickson Steel Co., 2309
Hamilton, Cleveland, Ohio.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Gorton, George, Mch. Co., 1110 W. 13th St.,
Racine, Wis.
Jacobs Mfg. Co., West Hartford, Conn.
Kempsmith Machine Co., 1819 S. 71st St.,
Milwaukee 14. Wis.

Keo Cutters, 19326 Woodward, Detroit, Mich. Morse Twist Drill & Mch. Co., New Bedford,

National Tool Co., 11200 Madison Ave., Cleveland, Ohio.
National Twist Drill & Tool Co., Rochester,

Mich.
Pratt & Whitney, West Hartford 1, Conn.
Union Twist Drill Co., Athol, Mass.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.

BABBITT

Bunting Brass & Bronze Co., Spencer & Carlton Aves., Toledo, Ohio.

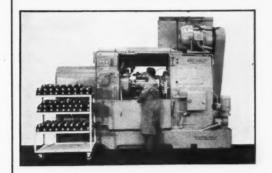
Johnson Bronze Co., New Castle, Pa. Rverson, Jos. T., & Son, 2558 W. 16th St., Ryerson, Jos. T., Chicago 18, III.

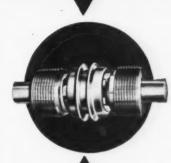
BALANCING EQUIPMENT

Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, III.
Gisholt Machine Co. (Static and Dynamic), 1245
E. Washington Ave., Madison 10, Wis.
Pope Machinery Corp., Haverhill, Mass.
Sundstrand Mch. Tool Co., 2531 11th St.,
Rockford, III.

(Continued on page 274)

This Automatic Chucker Uses





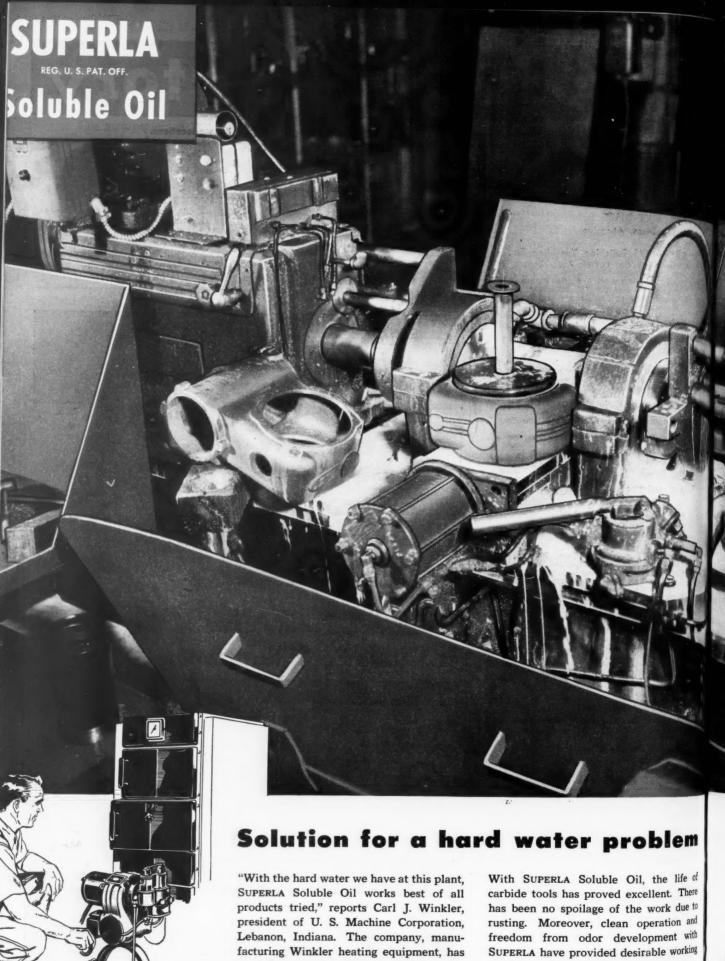
Fast Speeds and Heavy Feeds

For 20 years The National Acme Company has used compact ROCKFORD CLUTCHES on the spindles of their 4, 6 and 8 spindle chuckers. Their strong, positive action is well suited to the high power requirements for fast spindle speeds and heavy feeds at which ACME CHUCKERS operate. Let ROCKFORD clutch engineers help with your power transmission control problems.

ROCKFORD CLUTCH DIVISION



ROCKFORD CLUTCHES



used SUPERLA for 15 years. During this period, other coolants have been tried, but none has given the results obtained with SUPERLA Soluble Oil.

Boring of the cast iron main housing for a Winkler oil burner is illustrated above.

conditions for machine operators.

To help select the right coolant or cutting oil for your own machine tool operations, call for the services of a Standard Oil lubrication specialist. Contact your nearby Standard Oil Company office.

What's YOUR problem?



Meet Wesley L. Thurp, lubrication specialist with headquarters at Standard Oil's Indianapolis office. U. S. Machine Corporation is one of the manufacturing companies he contacts regularly in order to help keep production running smoothly.

Like all Standard Oil lubrication specialists, Wesley Tharp has a good background of experience plus thorough training in Standard's own schools. And like all specialists, his on-the-job assistance is always available to the industries in the area he serves. He is one of a corps of experienced men who make their headquarters wherever industry is located throughout the Midwest.

Put a Standard Oil lubrication specialist to work on your problem.



STANOSTAN

PUT MORE PUNCH INTO PRODUCTION with STANOSTAMP Compounds. Consider the case of this manufacturer of automotive components who boosted production from 10,000 piece parts to as many as 100,000 before dies required polishing. This was the result of switching from an oil base compound to STANOSTAMP Compound "C".

For maximum protection for both dies and work in your own pressroom, ask your Standard Oil lubrication specialist about STANOSTAMP. Three grades are available to cover a wide range of stamping and heavy drawing work on low carbon or alloy steel.

FIVE YEARS, NO CHANGE OF OIL. That's the record to date for the STANOIL Industrial Oil serving the hydraulic unit shown below. After five years of service the oil is in near-perfect condition. There is no deposit and no varnish in the hydraulic system. There has been no need to clean the system. For comparable trouble-free performance in your own hydraulic units, or for lubrication of speed reducers, head stock gears, auxiliary turbines, and compressors, call your local Standard Oil office. Or write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.





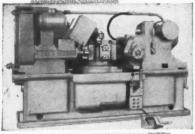
There due to on and t with working

or cutopera-

andard t your STANDARD OIL COMPANY

(INDIANA)





means a complete piece... at each index cycle

When a piece is finished it is completely finished without the necessity of a second operation. Furthermore it means more finished pieces in a given period of time and greater accuracy in every finished piece.

The "1-2-3" Method is exclusive with Goss & De-Leeuw. With it, three ends of a piece can be machined at a single chucking of the work, simultaneously or in sequence depending on the operations involved. It will pay you to investigate.

> GOSS & DELEEUW

ACOUCT CHATTE



Send for illustrated literature giving detailed information. Send samples and ask us to give you cost estimates of handling this work on a "1-2-3" Goss & DeLeeuw Automatic Chucking Machine





MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

BALLS

Adamas Carbide Corp., 999 South 4th St., Harrison, N. J. Kennametol, Inc., Latrobe, Pa. S K F Industries, Inc., P. O. Box 6731, North Philadelphia, Pa.

BARS, Phosphor Bronze

Bunting Brass & Bronze Co., Spencer and Carl-ton Aves., Toledo, Ohio. Johnson Bronze Co., New Castle, Pa.

BARS, Steel

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Bethlehem Steel Co., Bethlehem, Pa. Carpenter Steel Co., Reading, Pa. Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y. Firth Sterling Steel & Carbide Corp., McKeescott Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
LaSalle Steel Co., Hammond, Ind.
Republic Steel Corp., Union Drawn Steel Div., (Cold drawn), Republic Bldg., Cleveland, Ohio.
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.
Solar Steel Corp., Union Commerce Bldg., Cleveland, Ohio.
Timken Roller Bearing Co., Canton, Ohio.
U. S. Steel Corp. (American Steel & Wire Co. Div., Carnegie-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co. Div.), 436 7th Ave., Pittsburgh, Pa. Pa. Wheelock, Lovejoy & Co., Inc., Cambridge,

BASES, Machinery Welded

Mahon, R. C., Co., 6565 E. 8 Mile Rd., Detroit 34. Mich.

BEARINGS, Babbitt

Bunting Brass & Bronze Co., Spencer and Carl-ton Aves., Toledo, Ohio. Johnson Bronze Co., New Castle, Pa.

BEARING, Ball

Aetna Ball & Roller Bearing Co., 4612 Schubert Ave., Chicago, III.
Ball & Roller Bearing Co., Danbury, Conn.
Fafnir Bearing Co., New Britain, Conn.
Marlin-Rockwell Corp., 402 Chandler Bldg.,
Jamestown, N. Y.
Nice Ball Bearing Co., Nicetown, Philadelphia.
Pa.
Norma-Hoffmann Bearings Corp., Stamford.
Conn. Conn. S K F Industries, Inc., P. O. Box 6731, North Philadelphia, Pa. Torrington Co., Torrington, Conn.

BEARINGS, Bronze and Special Alloy

Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.
Johnson Bronze Co., New Castle, Pa.

BEARINGS, Lineshaft

Fafnir Bearing Co., New Britain, Conn.
Shafer Bearing Corp., Downers Grove, III.
S K F Industries, Inc., P. O. Box 6731, North
Philadelphia, Pa.
Orange Roller Bearing Co., Inc., Orange, N. J.
Standard Pressed Steel Co., Jenkintown, Pa.

BEARINGS, Needle

Orange Roller Bearing Co., Inc., Orange, N. J. Torrington Co., Torrington, Conn.

BEARINGS, Roller

BEARINGS, Roller

Aetna Ball & Roller Bearing Co., 4612 Schubert
Ave., Chicago, III.

Ball & Roller Bearing Co., Danbury, Conn.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., Harrison, N. J.

Marlin-Rockwell Corp., 402 Chandler Bldg.,
Jamestown, N. Y.

Norma-Hoffmann Bearings Corp., Stamford.
Conn.

Orange Roller Bearing Co., Inc., Orange, N. J.
Rollway Bearings Co., Inc., 541 Seymour St.,
Syracuse, N. Y.

Shafer Bearing Corp., Downers Grove, III.
S K F Industries, Inc., P. O. Box 6731, North
Philadelphia, Pa.
Timken Roller Bearing Co., Canton, Ohio.
Torrington Co., Torrington, Conn.

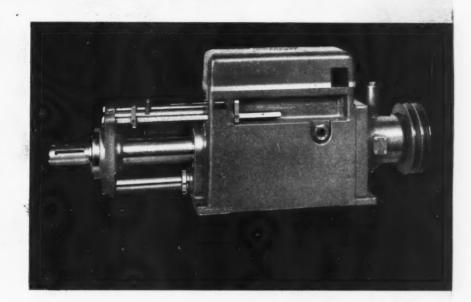
(Continued on page 278) (Continued on page 278)



DRILLUNTT* FROM DYNAMIC-

SPECIAL FEATURES:

Push button control. Mount in any position. Supplied with 9" or 12" stroke. Traverse rate over 400" per min. Feed rate up to 30" per min. Capacity 1/2" in steel. Two-belt sheave.



Here is the self-contained Drillunit — a compact unit that machine tool builders long have wanted. The introduction is opportunely timed to meet defense production for 1952.

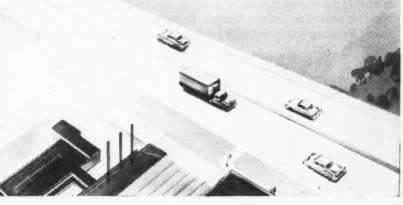
DRILLUNIT, INC.

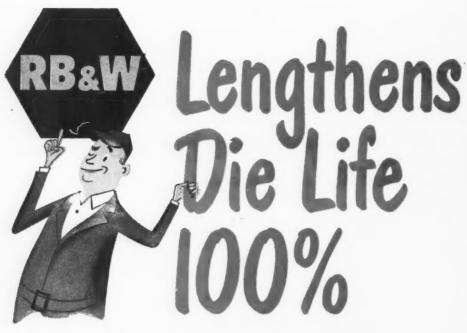
635 MT. ELLIOTT

DETROIT 7, MICHIGAN

Manufacturers Representatives:

A few desirable territories are open to qualified representatives.





STEPS UP PRODUCTION

■ The Tool Room of the Rock Falls, Ill., plant of Russel-Burdsall & Ward Bolt and Nut Company had a problem.

Here, dies, made of very tough, high-carbon, high-chrome steel, are bored and reamed for the Heading and Trimming Dept. machines. In this work, the Tool Room was getting a very poor finish, which resulted in short die life. Finally, one year ago, the foreman tried a special Sinclair cutting oil...

Results since have been remarkable. The Tool Room states that the dies are now near-perfect, that the necessity for any further finishing operation has been eliminated, and that die life has been increased — conservatively — 100%.

In addition, since the dies now last far longer, there's less downtime for changing dies. Therefore, production of bolts and nuts in this huge plant has been stepped up appreciably.

This is typical of the way the specialized Sinclair Cutting Oils and Coolants are solving machining problems. Perhaps they can help you, too. Phone or write the nearest Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.





SINCLAIR
CUTTING
OILS
and
COOLANTS



for metal working



BRALE Penetrator Accuracy Is Proved in Wilson's Standardizing Laboratory

• One point of hardness on the Rockwell C scale equals .00008" so penetrator accuracy must be constant. That's why Wilson maintains its Standardizing Laboratory for testing on many test blocks and approving every BRALE penetrator.

Each BRALE is precision ground to shape under high magnification and is accurate to the degree required for a research laboratory. Wilson's BRALE Penetrator gives true readings at all points on the dial. To get the greatest accuracy from your hardness tester, see that it is equipped with a diamond BRALE penetrator. Write for literature.

*Trade Mark Registered

ACCO WILSON MECHANICAL INSTRUMENT DIVISION AMERICAN CHAIN & CABLE 230-D Park Ave., New York 17, N. Y.

WILSON "ROCKWELL" and TUKON Hardness Testers

BEARINGS, Self-Lubricating (Oilless)

Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.
Johnson Bronze Co., New Castle, Pa.

BEARINGS, Tapered Roller

Timken Roller Bearing Co., Canton, Ohio. Torrington Co., Torrington, Conn.

BEARINGS, Thrust

Aetna Ball & Roller Bearing Co., 4612 Schubert Ave., Chicago, Ill.
Ball & Roller Bearing Co., Danbury, Conn.
Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.
Fafnir Bearing Co., New Britain, Conn.
General Electric Co., Schenectady, N. Y.
Marlin-Rockwell Corp., 402 Chandler Bldg.,
Jamestown, N. Y.
Norma-Hoffmann Bearings Corp., Stamford,
Conn. Conn. Orange Roller Bearing Co., Inc., Orange, N. J. Shafer Bearing Corp., Downers Grove, III. Timken Roller Bearing Co., Canton, Ohio. Torrington Co., Torrington, Conn.

BELT FASTENERS, Metal, Leather, Etc.

Bristol Co., Platts Mills, Waterbury, Conn.

BELT SHIFTERS

Standard Pressed Steel Co., Jenkintown, Pa.

BELTING TRANSMISSION

Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa.

BENCHES, Work, and Bench Legs

Standard Pressed Steel Co., Jenkintown, Pa.

BENDING MACHINES, Angle Iron, Plate, Etc.

Consolidated Mch. Tool Corp., 565 Blossom Rd., Rochester, N. Y. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III.
Kling Bros. Engineering Works, 1320 No.
Kostner Ave., Chicago 51, III.
O'Neill-Irwin Mfg. Co., Lake City, Minn.
Struthers Wells Corp., Machinery Div., Titus-

BENDING MACHINES, Hydraulic American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio. Baldwin-Lima-Hamilton Corp., Philadelphia 42,

Pa. Bethlehem Steel Co., Bethlehem, Pa. Buffalo Forge Co., 490 Broadway, Buffalo, N. Y. Chambersburg Engrg. Co., Chambersburg, Pa. Farquhar, A. B., & Co., 21 Duke St., York, Pa. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio. Lake Erie Engrg. Corp., Kenmore Sta., Buffalo, N. Y.

N. Y.
Morgan Engineering Co., Alliance, Ohio.
Niagara Machine & Tool Works, 683 Northland
Ave., Buffalo, N. Y.
O'Neill-Irwin Mfg. Co., Lake City, Minn.
Struthers Wells Corp., Machinery Div., Titusville, Pa.
Watson-Stillman Co., Roselle, N. J.

BENDING MACHINES, Pipe

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y. Farquhar, A. B., & Co., 21 Duke St., York, Pa. O'Neill-Irwin Mfg. Co., Lake City, Minn. Watson-Stillman Co., Roselle, N. J. Williams, White & Co., Moline, III.

BLAST CLEANING EQUIPMENT

Leiman Bros., Inc., 156 Christie St., Newark, N. J. N. J. Pangborn Corp., Hagerstown, Md. Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

BLOWERS

Buffalo Forge Co., 490 Broadway, Buffalo, Ingersoll-Rand Co., Phillipsburg, N. J. Leiman Bros., Inc., 156 Christie St., Newark,

(Continued on page 280)



۱. J.

Serves Border to Border, Coast to Coast

OMPLETE, fast and accurate service on Shield → Brand cutting tools is now provided for Texas and the Southwest through our new branch at Dallas.

Today, from five branches and our headquarters in Cleveland, we provide nationwide, an unexcelled Service of Supply on Shield Brand cutting tools.

Ask your local Industrial Supply Distributor for Standard Shield Brand Tools. They are Foremost Quality and promptly available.



STANDARD TOOL (0. CLEVELAND 14, OHIO

3950 CHESTER AVENUE

New York • Detroit • Chicago • Dallas • San Francisco

STANDARDIZE AND SAVE WITH STANDARD RED SHIELD METAL CUTTING TOOLS. THERE IS A STANDARD DISTRIBUTOR NEAR YOU AND READY TO SERVE YOU.



RELENTLESS PRODUCTION SCHEDULES

and

SMALL PRECISION GEARS

FEELING FUTILE?

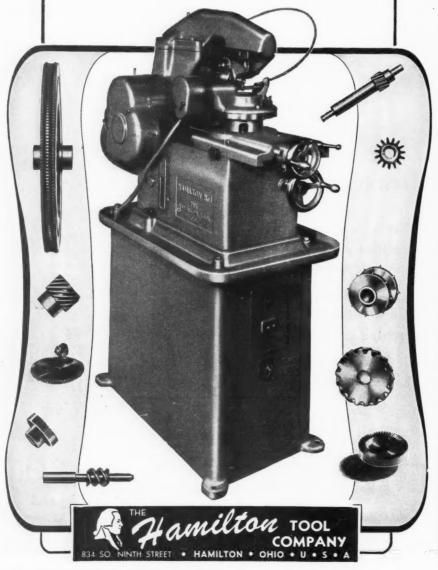
Unusual conditions are usual now. You are expected to build small, precision mechanisms on fast production schedules. And you will be expected to produce them better and faster tomorrow. But why worry? All you will need will be better machines.

MORALE BOOSTER

And better machines are here now! The Hamilton No. I Precision Small Gear Hobber will solve your problem in respect to gears. All gears, regardless of shape, if they are small and exact, can be produced faster on the Hamilton No. I.

FREE HELP

You don't expect full information about such a machine in the small space of one advertisement. But full information is available . . . ten printed pages of it . . . and offered to you free. Write for our Bulletin No. H-492, with supplement. Do it now . . . tomorrow you may need to know!



BOILER TUBES

Bethlehem Steel Co., Bethlehem, Pa.
Republic Steel Corp., Steel and Tubes Div.,
Republic Bldg., Cleveland I, Ohio.
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th
St., Chicago 18, III.
U. S. Steel Corp., National Tube Co. Div.,
436 7th Ave., Pittsburgh, Pa.

BOLT AND NUT MACHINERY

Ajax Mfg. Co., Euclid, Cleveland 17, Ohio.
Hill Acme Co., 1201 W. 65th St., Cleveland 2,
Ohio.
Landis Machine Co., Inc., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
New Britain Machine Co., New Britain-Gridley
Mch. Div., New Britain, Conn.

BOLTS AND NUTS

BOLTS AND NUTS

Aluminum Co. of America, Oliver Bldg., Pittsburgh, Pa.

Bethlehem Steel Co., Bethlehem, Pa.

Erie Bolt & Nut Co., Erie, Pa.

National Acme Co., 170 E. 131st St., Cleveland, Ohio.

Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.

Ottemiller, W. H., & Co., York, Pa.

Republic Steel Corp., Bolt & Nut Div., Republic Bldg., Cleveland 1, Ohio.

Russell, Burdsall & Ward Bolt & Nut Co., 100 Midland Ave., Port Chester, N. Y.

BOLTS, T-Slot

Standard Shop Equipment Co., Inc., 8299 W.
Tinicum Ave., Philadelphia, Pa.

BOOKS. Technical

Industrial Press, 148 Lafayette St., New York 13, N. Y. Lincoln Electric Co., 22801 St. Clair Ave., Cleveland, Ohio.

BORING AND DRILLING MACHINES

BORING AND DRILLING MACHINES
Baker Bros., Inc., Sta. F, P. O. Box 101, Toledo
10, Ohio.
Barnes Drill Co., 814 Chestnut, Rockford, Ill.
Barnes, W. F. & John, Co., 201 S. Water St.,
Rockford, Ill.
Bullard Co., Brewster St., Bridgeport 2, Conn.
Canedy-Orto Div. Cincinnati Lathe & Tool Co.,
Oakley, Cincinnati, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
32, Mich.
Foote-Burt Co., 1300 St. Clair Ave., Cleveland
8, Ohio.
Ingersoll Milling Mch. Co., 2442 Douglas St.,
Rockford, Ill. Moline Tool Co., 102 20th St., Moline, Ill.
National Acme Co., 170 E. 131st St., Cleveland, Ohio.
Rogers Machine Works, Inc., Buffalo 10, N. Y.
Wales-Strippit Corp., North Tonawanda, N. Y.

BORING AND TURNING MILLS, Vertical

American Steel Foundries, King Mch. Tool Div., Paddock Rd. and Tennessee Ave., Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio. Bullard Co., Brewster St., Bridgeport 2, Conn. Cosa Corp., 405 Lexington Ave., New York 17, N. Y. N. Y. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.
Rogers Machine Works, Inc., Buffalo 10, N. Y.

BORING BARS Adamas Carbide Corp., 999 South 4th St., Harrison, N. J.
Apex Tool & Cutter Co., Inc., 237 Canal St., Skielton, Conn.
Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.
Bullard Co., Brewster St., Bridgeport 2, Conn. Carbology Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.
Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis...
Erickson Tools Div. Erickson Steel Co., 2309 Hamilton, Cleveland, Ohio.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill. Adamas Carbide Corp., 999 South 4th St., Rockford, III. Lehmann Machine Co., 3560 Chouteau Ave., Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.
Lovejoy Tool Co., Inc., Springfield, Vt.
Madison Mfg. Co., Muskegon Heights, Mich.
Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.
Warner & Swasey Co., 5701 Carnegie Ave.,
Cleveland 3, Ohio.
Williams, J. H., & Co., 400 Vulcan St., Buffalo

(Continued on page 282)



H ll Axelson precision apron gears, bearings and shafts receive adequate lubrication including the sliding bevel gears, which are immersed in oil. The apron, being wholly enclosed, eliminates chips, dirt and other foreign matter. The Axelson apron has its own pressure oiling system, with visual oil gage. This same system also delivers oil under pressure to the carriage ways, the cross slide and other critical areas. The split nut too, receives automatic lubrication. The oil pump and the apron clutches are easily adjusted from the front side. The same attention to detail carries through the entire Axelson Lathe line, where precision construction assures not only smooth operation, but also high resistance to wear and shock loading.

16th Div.,

nd 2.

idley

Pitts-

leveollier, oublic

9 W.

York Ave., ES oledo III. r St.,

N. Y. etroit eland St., leve-N. Y. N. Y.

Tool Ave., onn. 17, troit d du

St.,

St.,

ong

onn. 237,

ewis

309

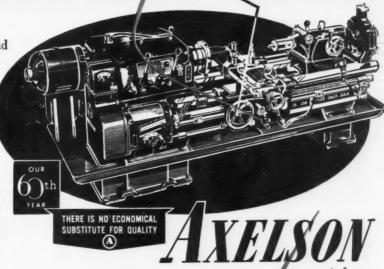
troit

St.,

ve.,

. ve.,

falo



HEAVY DUTY ENGINE LATHES . TOOL ROOM LATHES . GAP BED LATHES

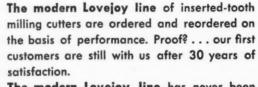
AXELSON MANUFACTURING CO. . LOS ANGELES 58 . NÉW YORK 7 . ST. LOUIS 16

AUTHORIZED DISTRIBUTORS IN ALL PRINCIPAL INDUSTRIAL CENTERS



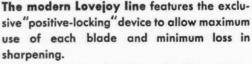
the word from the wise in milling cutter circles







The modern Lovejoy line has never been more complete. Improved new designs, both standard and special, are coming constantly from our large engineering staff.





The modern Lovejoy line of milling cutters, boring tools, arbors, flywheels, etc., plus outstanding field service, can help you cut your production costs, just as it has for others.

129 MAIN ST., SPRINGFIELD, VERMONT



LOVEJO TOOL COMPANY, INC.

BORING, DRILLING AND MILLING MACHINES, Horizontol

(Floor, Planer or Table Types)

Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit Giddings & Lewis Mch. Tool Co., Fond du Lac,

Wis.
Gray, G. A., Co., Woodburn Ave. and Penn
R. R., Evanston, Cincinnati, Ohio.
Ingersoll Milling Mch. Co., 2442 Douglas St.,
Rockford, III.
Lucas Mch. Tool Div., New Britain Mch. Co.

Lucas Mch. Tool Div., New Britain Mch. Co., 12302 Kirby Ave., Cleveland 8, Ohio.

BORING HEADS

Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn. Chandler Tool Co., 514 Ohio Ave., Muncie, Ind. Davis Boring Tool Div., Giddings & Lewis Ma-chine Tool Co., Fond du Lac, Wis. Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford. III. Milling Mch. Co., 2442 Douglas St., Rockford, Ill. Mummert-Dixon Co., Hanover, Pa. Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y. Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

mi an

rec

in

WO

ing Th

to

ho

un

co

BORING MACHINES

Chandler Tool Co., 514 Ohio Ave., Muncie, Ind. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Heald Machine Co., 10 New Bond St., Wor-

Heald Machine Co., 10 New Bond St., Wor-cester 6, Mass. National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind. New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.

BORING MACHINES, Jig

American Sip Corp., 100 E. 42nd St., New York 17, N. Y. Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio.
Cleereman Mch. Tool Co., Green Bay, Wis.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Kearney & Trecker Corp., Milwaukee, Wis.
Moore Special Tool Co., Inc., 724 Union Ave., Bridgeport, Conn.
Orban, Kurt, Co., 205 E. 42nd St., New York 17, N. Y.

Orban, Kurt, Co., 205 E. 42nd St., New York 17, N. Y. Pratt & Whitney, West Hartford 1, Conn. Triplex Machine Tool Corp., 125 Barclay St., New York, N. Y. Wales-Strippit Corp., North Tonawanda, N. Y.

BORING TOOLS

Adamas Carbide Corp., 999 South 4th St.,

Adamas Carbide Corp., 999 South 4th St., Harrison, N. J.
American Steel Foundries, King Mch. Tool Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.
Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn.
Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, Ill.
Atrax Co., Newington, Conn.
Bullard Co., Brewster St., Bridgeport 2, Conn.
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.
Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.

Giddings & Lewis Mch. Tool Co., Fond du Lac.

Giddings & Lewis Mch. Tool Co., Fond du Lac. Wis.

Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.

Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.

Kennametal, Inc., Latrobe, Pa.

Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.

Lovejoy Tool Co., Inc., Springfield, Vt.

Madison Mfg. Co., Muskegon Heights, Mich.

Metal Carbides Corp., Youngstown, Ohio.

Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

Union Twist Drill Co., Athol, Mass.

Warner & Swasey Co., 5701 Carnegie Ave.,

Cleveland 3, Ohio.

Wesson Co., 1220 Woodward Heights Blvd.,

Ferndale, Mich.

Williams, J. H., & Co., 400 Vulcan St., Buffalo

7, N. Y.

BRAKES, Press and Bending

Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio.

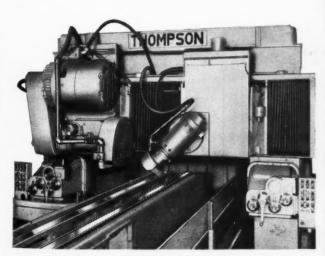
(Continued on page 284)

New Thompson Way Grinder Developments

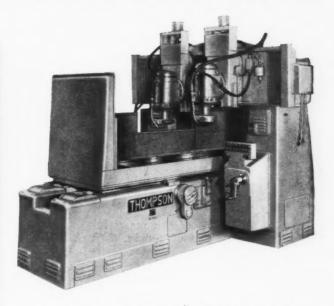
Reduce Costs ... Speed Machine Tool Production

Way Grinders now available with single, multiple heads, or combinations of horizontal and vertical heads and in sizes to meet all requirements.

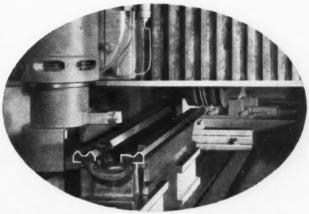
Thompson has produced machine tool way grinders in many types and sizes that have eliminated handwork and produced economical and accurate ground ways. However, recently increased production grinding of ways has been made possible by many new Thompson Way grinding developments such as: automatic grinding and truing cycles; dual vertical or horizontal heads for grinding ways different heights; horizontal multi-wheel grinding and vertical side and undercutting head; Hydrail way grinding for giant columns or bed ways. Three of the new Thompson Way Grinders are shown here.



Designed especially for extremely large machine tool way grinding is this typical Thompson Hydrail Way Grinder. Size 48" x 48" x 192". Part: grinder bed ways.



One of several new Thompson Double Head Dovetail Way Grinders installed to speed work and hold accuracy in the plant of a leading lathe manufacturer.



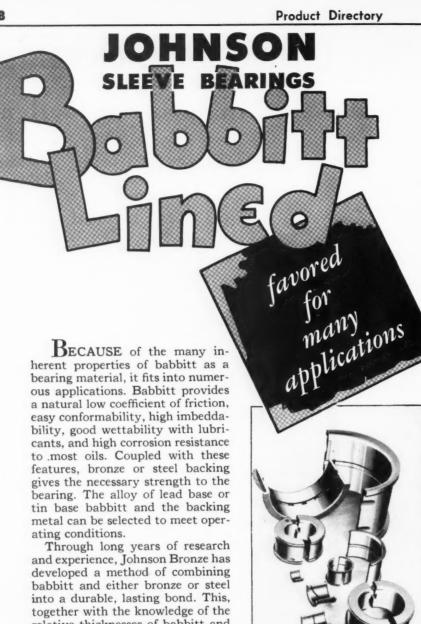
Multi-wheel grinding with auxiliary vertical head. Equipped with horizontal spindle having dual spaced wheels and auxiliary inclinable spindle. The front contoured grinding wheel grinds the rear set of ways and the rear grinding wheel grinds the front set, with vertical head grinding the sides and undersurface of the ways and rack seat.

Write for details Today.

The Thompson Grinder Company, Springfield, Ohio

Copyright 1952-The Thompson Grinder Co.

Thompson SURFACE Grinders



relative thicknesses of babbitt and backing for utmost efficiency and high quality workmanship, assure you of long, satisfactory service from Johnson Babbitt-Lined Bearings. Our engineers will gladly consult with you on proposed appli-

cations

JOHNSON BRONZE COMPANY 520 South Mill St., New Castle, Pa.

Technical data sheets on babbitt-lined bearings will be sent free on request. Write for an appointment BRONZE ON-STEEL CAST BRONZE



Bliss, E. W., Co., 1375 Raff Road, S. W., Canton, Ohio.
Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.
Cleveland Crane & Engrg. Co., Wickliffe, Ohio. Cleveland Crane & Engrg. Co., Wickliffe, Ohio. Columbia Machinery & Engineering Corp., Hamilton 1, Ohio.
Dreis & Krump Mfg. Co., 7416 Loomis Blvd., Chicago 36, III.
Ferracute Machine Co., Bridgeton, N. J. Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, III.
Watson-Stillman Co., Roselle, N. J.

BROACHES

BROACHES

American Broach & Mch. Co., Ann Arbor, Mich. Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit, Mich.

Detroit Broach Co., 20201 Sherwood Ave., Detroit, Mich. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Lapointe Mch. Tl. Co., Tower St., Hudson, Mass. National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

Zogar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

BROACHING MACHINES

BROACHING MACHINES

American Broach & Mch. Co., Ann Arbor, Mich. Cincinnati Milling Mch. Co., Cincinnati, Ohio. Colonial Broach Co., P. O. Box 37, Harper Sta.,

Detroit, Mich.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Foote-Burt Co., 1300 St. Clair Ave., Cleveland

Roote-Burt Co., 1300 St. Clair Ave., Cleveland 8, Ohio. Lapointe Mch. Tl. Co., Tower St., Hudson, Mass. National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich. Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.

Wis. Wilson, K. R., 215 Main St., Buffalo, N. Y. Zagar Tool, Inc., 24000 Lakeland Blvd., Cleve-land 23, Ohio.

BRONZE

American Brass Co., Waterbury 20, Conn.
Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.
Chase Brass & Copper Co., Inc., 1949 Rodney
St., Waterbury 20, Conn.
Johnson Bronze Co., New Castle, Pa.

BRUSHES, Industriol, Wire Wheel, Etc. Osborn Mfg. Co., 5401 Hamilton Ave., Cleve-land, Ohio. Pittsburgh Plate Glass Co., Brush Div., 3221 Frederick Ave., Baltimore, Md.

BUFFERS

Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md., (Portable Elec.). Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Gardner Machine Co., 414 E. Gardner St., Beloit, Wis.

BULLDOZERS

Ajax Mfg. Co., Euclid, Cleveland 17, Ohio. American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati,

Ohio.
Atrax Co., Newington, Conn.
Baldwin-Lima-Hamilton Corp., Philadelphia 42.

Pa.
Chambersburg Engrg, Co., Chambersburg, Pa.
Hufford Machine Works, Inc., 1700 E. Grand
Ave., El Segundo, Calif.
Kling Bros. Engineering Works, 1320 No.
Kostner Ave., Chicago 51, Ill.
Lake Erie Engineering Corp., Kenmore Station,
Buffalo, N. Y.
Watson-Stillman Co., Roselle, N. J.

See Files and Burs, Rotary.

BUSHINGS, Brass, Branze, Carbide, Etc. Adamas Carbide Corp., 999 South 4th St., Adamas Carbide Corp., 999 304...
Harrison, N. J.
Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York.
Johnson Bronze Co., New Castle, Pa.
Kennametal, Inc., Latrobe, Pa.

BUSHINGS, Hardened Danly Machine Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, III. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32 Mich

S2, Mich.

Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
U. S. Steel Co., Inc., 436 7th Ave., Pittsburgh, Pa.

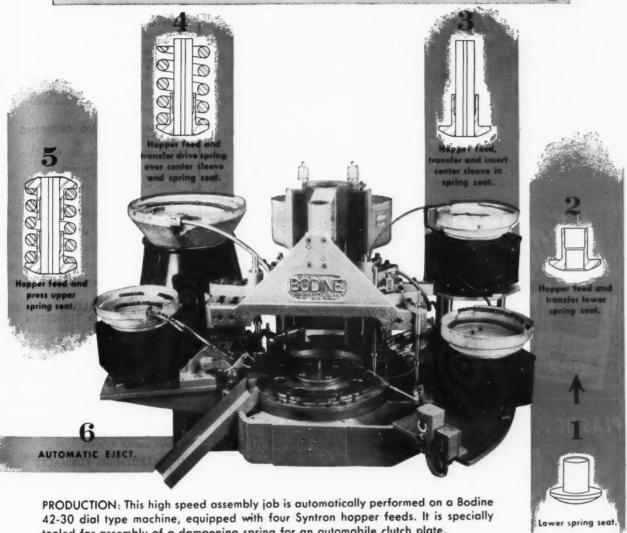
BUSHINGS, Jig

Colonial Bushings, In Sta., Detroit, Mich Inc., P. O. Box 37, Harper

(Continued on page 286)

BODING CASE HISTORY NO. 33 Boding assembles a dampening spring automatically



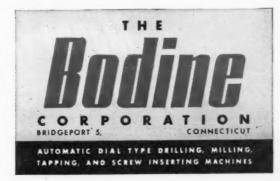


tooled for assembly of a dampening spring for an automobile clutch plate.

All four components are hopper fed to position. Production is 40 assemblies per minute . . . automatically ejected.

Bodine engineers can solve your problems for repetitive production of small parts . . . milling, drilling, tapping or assembly, automatically . . . at low cost. Write us!

> You Can't Meet Tomorrow's Competition With Yesterday's Machine Tools



Aves., Ohio.

Blvd., Ken-

Mich. 237 sta., Ave., troit

lvd., eve-

hich. Sta., . Y and ass. e 4,

221



Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Meyers, W. F., Co., Bedford, Ind. Universal Engrg. Co., Frankenmuth, Mich.

CABINETS, Tool

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.

Ames, B. C., & Co. (Dial), Waltham 54, Mass. Brown & Sharpe Mfg. Co., Providence, R. I. Inter-Continental Trading Corp., 90 West St., New York 6, N. Y. Millers Falls Co., Greenfield, Mass. Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y. Starrett, The L. S., Co., Athol, Mass.

CAM CUTTING MACHINES

Cosa Corp., 405 Lexington Ave., New York 17, N. Y. N. Y.
Fellows Gear Shaper Co., Springfield, Vt.
Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Sundstrand Machine Tool Co., 2531 11th St.,
Rockford, III.

CAM MILLING AND GRINDING MACHINES

Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. Landis Tool Co., Waynesboro, Pa. Rowbottom Machine Co., Sheffield St., Water-ville, Waterbury, Conn.

CAMS

Eisler Engrg. Co., Inc., 760 S. 13th, Newark 3, Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn. Kux Mch. Co., 3930 W. Harrison St., Chicago, III. Rowbottom Machine Co., Sheffield St., Water-ville, Waterbury, Conn. Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

CARBIDES, TANTALUM TITANIUM AND TUNGSTEN

Adamas Carbide Corp., 999 South 4th St. Harrison, N. J.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. Firth Sterling Steel & Carbide Corp., McKeesport Park port, Pa.
Kennametal, Inc., Latrobe, Pa.
Metal Carbides Corp., Youngstown, Ohio.
Super Tool Co., 21650 Hoover Rd., Detroit 13,

Metal Super Tool Co., 2...
Mich.
Wesson Co., 1220 Woodward Heights
Ferndale, Mich.
Willey's Carbide Tool Co., 1340 W. Vernor
Hwy., Detroit 1, Mich.

CASTINGS, Aluminum, Brass, Bronze, Magnesium, Etc.

Aluminum Co. of America, Oliver Bldg., Pittsburgh, Pa.

Bethlehem Steel Co. (Brass and Bronze only).

Bethlehem, Pa.

Bethlehem, Pa.

Bunting Brass & Bronze Co., Spencer and Carlton Aves., Toledo, Ohio.

CASTINGS, Die

Aluminum Co. of America, Oliver Bldg., Pitts-burgh, Pa. American Brass Co., Waterbury 20, Conn. Madison-Kipp Corp., Madison, Wis.

CASTINGS, Iron

Bethlehem Steel Co., Bethlehem, Pa. Brown & Sharpe Mfg. Co., Providence, R. I. Chambersburg Engineering Co., Chambersburg,

CASTINGS, Steel, Alloys, Etc.

Castings, Steel, Alloys, Etc.

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

Bethlehem Steel Co., Bethlehem, Pa.

Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.

Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.

Haynes Stellite Div., Union Carbide & Carbon

Corp., 30 E. 42nd St., New York.

U. S. Steel Corp., Columbia Steel Co., Div.,

436 7th Ave., Pittsburgh, Pa.

(Continued on page 288)

Waldes Truarc Internal Grooving Tool

for precision cutting of internal grooves in bores and housings FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!



Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Detroit

strong

. I. st St.,

Ave., te St.,

rk 17, Phila-Manth St.,

Man-Vater-

ark 3, estead icago, Vateretroit

n St.

n, Pa.

h. Kees-

it 13,

Blvd.,

'ernor

Pitts-

only). Carl-

Pitts-

l. burg,

rbon

Div.,

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressureespecially suitable for unskilled operators.

Groove Double groove Groove located located from

located from top of hole top of hole



from bottom of hole

The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

Write now for Catalog giving mechanical details, cutting sizes...extra features...full information

WALDES

GROOVING TOOL

WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y. **Waldes Truarc Grooving Tool** Manufactured under U. S. Pat. 2,411,426

Waldes Kohinoor, Inc., 47-16 Austel Place Long Island City 1, New York M-084

Please send me complete information on Waldes Truarc Internal Grooving Tool.

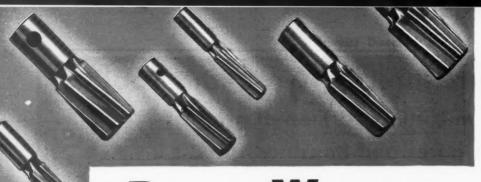
Name_

Company____

Business Address____

_Zone___State__

MACHINERY, August, 1952-287

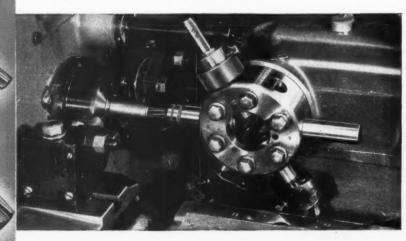


PRATT & WHITNEY

HIGH SPEED STEEL

Screw Min

REDUCE TOOLING COSTS... INCREASE OUTPUT



The "P & W" marking is your assurance of outstanding performance. High speed steel, skillful heat treating and correct design with ample chip clearance mean fast, free cutting performance, long life and low cost. Holes are round, straight and accurately sized. P & W FLOATING HOLDERS are recommended as an additional aid to reaming accuracy.

Any decimal size from .060" to 1.010" can be furnished promptly and inexpensively from extensive stocks of semi-finished hardened blanks. The entire range of 24 basic sizes requires only 6 standardized shanks and 5 overall lengths. Required holders, cam changes and set-up times are all greatly reduced. For complete information, write on your Company letterhead to the Branch Office nearest you - or direct to West Hartford; ask for the new Pratt & Whitney Bulletin No. 552.

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

WEST HARTFORD 1, CONNECTICUT, U.S.A.



EXPORT DEPT WEST HARTFORD

CUTTING TOOLS . GAGES . MACHINE TOOLS

CEMENT, Disc Grinding Wheel

Besly-Welles Corp., Beloit, Wis. Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

Hirsc ha Jacol Skinn Bri

CHL Erick Ho

Errin

CHL

CHL Buck

Mi Bullo Cush Co Erick Ho Gisho Jacol

Jone

Rivet 35

Schei Ne Skinr Br Stand la

Warr

CHL

CHI

CHU Erick Ho Errin Av Jarvi Natio

CHU

CHU

Errin

CIR

Neise Ne Stand Til

CLA

CENTERING MACHINES

Consolidated Mch. Tool Corp., Rochester, N. Y. Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32 Mich. Ex-Cell-O Corp., 1200 Oakman Bivd., Detroit 32, Mich. Jones & Lamson Mch. Co., Springfield, Vt. Seneca Falls Mch. Co., Seneca Falls, N. Y. Sundstrand Machine Tool Co., 2531 11th St., Rockford, III.

CENTERS, Lathe

Adamas Carbide Corp., 999 South 4th St., Harrison, N. J. Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich, Firth Sterling Steel & Carbide Corp., McKees-Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York.
Houston Grinding & Mfg. Co., 2110 Quitman St., Houston 10, Tex.
Kennametal, Inc., Latrobe, Pa.
Metal Carbides Corp., Youngstown, Ohio.
Morse Twist Drill & Mch. Co., New Bedford, Mass. Mass.
Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
per Tool Co., 21650 Hoover Rd., Detroit 13, lana, Cinc.
Super Tool Co., 21650 ricc.
Mich.
Union Twist Drill Co., Athol, Mass.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.

CHAINS, Power Transmission and Conveyor

Boston Gear Works, Inc., No. Quincy 71, Mass. Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio Gear Co., 1333 E. 177.... Ohio. Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Pa.

CHISELS AND CHISEL BLANKS

Bethlehem Steel Co., Bethlehem, Pa. Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.

CHUCKING MACHINES

CHUCKING MACHINES

Bardons & Oliver, Inc., Ft. W. 9th St., Cleveland 13, Ohio.

Bullard Co., Brewster St., Bridgeport 2, Conn.

Gisholt Machine Co., 1245 E. Washington Ave.,

Madison 10, Wis.

Goss & DeLeeuw Mch. Co. (Multiple Spindle),

Kensington, Conn.

Heald Machine Co., 10 New Bond St., Worcester 6, Mass.

Jones & Lamson Mch. Co., 160 Clinton St.,

Springfield, Vt.

National Acme Co. (Multiple Spindle), 170 E.

131st St., Cleveland, Ohio.

Potter & Johnston Co., 1027 Newport Ave.,

Pawtucket, R. I.

Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III. ford, III.
Warner & Swasey Co., 5701 Carnegie Ave.,
Cleveland 3, Ohio.

CHUCKS, Air Operated

Cushman Chuck Co., Windsor Ave., Hartford 2, Cushman Chuck Co., Windson Ave., Indiana Conn.
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.
Hufford Machine Works, Inc., 1700 E. Grand Ave., El Segundo, Calif.
Mead Specialties Co., 4114 North Knox Ave., Chicago 41, III.
Schrader's Son, A., 470 Vanderbilt Avenue, Brooklyn, N. Y.
Skinner Chuck Co., 344 Church St., New Britain, Conn.
Tomkins-Johnson Co., Jackson, Mich.
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleve-land 23, Ohio.

CHUCKS, Collet or Split

See Collets.

CHUCKS, Diaphragm

Van Norman Co., 3640 Main St., Springfield 7, Mass. Woodworth, N. A., Co., 1300 E. Nine Mile Rd., Detroit 20, Mich.

CHUCKS, Drill

Erickson Tools Div. Erickson Steel Co., 2309 Hamilton, Cleveland, Ohio.

Ettco Tool Co., Inc., 592 Johnson Ave., Brooklyn, N. Y.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Jacobs Mfg. Co., West Hartford, Conn.
Skinner Chuck Co., 344 Church St., New Rritain, Conn. Skinner Chuck Co., 344 Church St., New Britain, Conn. Standard Tool Co., 3950 Chester Ave., Cleve-land, Ohio.

CHUCKS, Full Floating

Erickson Tools Div. Erickson Steel Co., 2309 Hamilton, Cleveland, Ohio. Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, Staten Island, N. Y. Gisholt Mch. Co., Madison 10, Wis.

CHUCKS, Gear

oklyn

N. Y. etroit t. ſ. h St.,

n St., 237, th. :Kees-

, De-

arbon

itman

dford. Ave..

Cleve-

it 13, Blvd.,

Mass. eland, G St.,

h St.,

Cleve-Conn. Ave.,

ndle), Wor-

n St.,

70 E.

Ave.,

Rock-

Ave.,

ord 2,

Ave.. Grand

Ave., enue, New

leve-

eld 7,

Rd.,

2309

Woodworth, N. A., Co., 1300 E. Nine Mile Rd., Detroit 20, Mich.

CHUCKS, Lathes, Etc.

Mich.
Bullard Co., Brewster St., Bridgeport 2, Conn.
Cushman Chuck Co., Windsor Ave., Hartford 2, Conn.
Erickson Tools Div., Erickson Steel Co., 2309
Hamilton, Cleveland, Ohio.
Gisholt Mch. Co., Madison 10, Wis.
Jacobs Mfg. Co., West Hartford, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
Rivett Lathe & Grinder, Inc., Brighton, Boston
35, Mass.

Buck Tool Co., 220 Schippers La., Kalamazoo,

35, Mass.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Skinner Chuck Co., 344 Church St., New
Britain, Conn.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Warner & Swasey Co., 5701 Carnegie Ave.,
Cleveland 3, Ohio.
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

CHUCKS, Magnetic

Brown & Sharpe Mfg. Co., Providence, R. I. DoAll Co., 254 Laurel Ave., Des Plaines, III. Hanchet Magna-Lock Corp., Big Rapids, Mich. Toft-Peirce Mfg. Co., Woonsocket, R. I. Walker, O. S., Co., Inc., Worcester, Mass.

CHUCKS, Power Operated

Skinner Chuck Co., 344 Church St., New Britain, Conn.

CHUCKS, Quick Change and Safety

Erickson Tools Div. Erickson Steel Co., 2309 Hamilton, Cleveland, Ohio.
Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N. Y.
Jarvis, Charles L., Co., Middletown, Conn.
National Tool Co., 11200 Madison Ave., Cleveland, Ohio.
Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y.
Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, III.

CHUCKS, Ring Wheel

Gardner Mch. Co., Div. Landis Tool Co., 414 E. Gardner St., Beloit, Wis.

CHUCKS, Tapping

Frington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N. Y. Jacobs Mfg. Co., West Hartford, Conn. Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, III. Skinner Chuck Co., 344 Church St., New Britain, Conn.

CIRCUIT-BREAKERS

General Electric Co., Schenectady 5, N. Y.

CLAMPING APPLIANCES FOR MACHINES TOOLS

Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y. Standard Shop Equipment Co., Inc., 8299 W. Tinicum Ave., Philadelphia, Pa.

CLAMPS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Brown & Sharpe Mfg. Co., Providence, R. I. Danly Mch. Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, III.

(Continued on page 290)



PRATT & WHITNEY

Screw Machine

CUTTING TOOLS

ASSURE UNIFORM QUALITY and DEPENDABLE ACCURACY



Manufactured by the most modern processes from only the finest, selected materials, Pratt & Whitney Screw Machine Cutting Tools bring you the combined advantages of careful, precise metallurgical control and uniform quality - resulting in long tool life at lowest cost.

- 1. Stub Screw Machine Reamers
- 2. Floating Reamer Holders
- 3. Monocone Dies and Die Holders 4. Duocone Dies and Die Holders
- 5. JCO Cut-Off Blades
- 6. Spiral Point Bottoming Taps
- 7. Knurling Tools
- Rourls
 Blue Helix Chucking Reamers
 Blue Helix Chucking Reamers
 Adjustable Round Split Dies and Holders
 Ground Thread Taps (all types)
- 12. Screw Slotting Cutters

Obtainable from comprehensive stock maintained at the P & W Branch Office nearest you, or from Factory Stock at West Hartford, Conn.

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY WEST HARTFORD 1, CONNECTICUT, U. S. A.



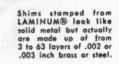
STOCK STEMPORATE STANCES CO. NEW YORK STANCES CO. ST. LOUIS

CUTTING TOOLS . GAGES . MACHINE TOOLS

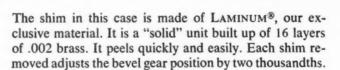




CAN SAVE YOU TWO HOURS!



Adjusting bevel gear mesh with a laminated shim is a matter of two seconds to remove a lamination!



You save time by easier machining tolerances on the housing; you save time by eliminating pesky assembly machining; you save by not tying up a machine intermittently. IT'S EASIER!

SEND FOR LITERATURE



SHIM HEADQUARTERS SINCE 1913

Check Our Stampings Division For Your Stamped Parts Requirements

3908 UNION STREET . GLENBROOK, CONNECTICUT

290-MACHINERY, August, 1952

DoAll Co., 254 Laurel Ave., Des Plaines, III. Mead Specialties Co., 4114 N. Knox Ave., Chicago 41, III. Rivett Lathe & Grinder, Inc., Brighton, Boston Rivett Lathe & Grinaer, Inc., Brighton, Basis, 35, Mass.
Standard Shop Equipment Co., Inc., 8299 W. Tinicum Ave., Philadelphia, Pa. Starrett, The L. S., Co., Athol, Mass.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

CLEANERS, Chemical, for Metal

Bullard Co., Bullard-Dunn Process Div., Brewster St., Bridgeport 2, Conn.
Oakite Products, Inc., 19 Rector St., New York, N. Y.

CLUTCHES

Barnes Drill Co., 814 Chestnut, Rockford, III. Clearing Mch. Corp., 6499 W. 65th St., Chicago 38, III. Clearing Mch. Corp., 6499 W. 65th St., Chicago 38, III. Farrel-Birmingham Co., Inc., Ansonia, Conn. Lipe-Rollway Corp., 806 Emerson Ave., Syra-cuse, N. Y. Rockford Clutch Div., Borg-Warner Corp., 410 Catherine St., Rockford, III. Twin Disc Clutch Co., 1361 Racine St., Racine, Wis. Warner Electric Brake & Clutch Co., Beloit, Wis.

COLLARS, Safety

Standard Pressed Steel Co., Jenkintown, Pa.

COLLETS

Brown & Sharpe Mfg. Co., Providence, R. I. Erickson Tools Div. Erickson Steel Co., 2309 Hamilton, Cleveland, Ohio. Gisholt Mch. Co., 1245 E. Washington Ave., Madison 10, Wis. Hardinge Bros., Inc., 1418 College Ave., Elmira N. Y. N. Y.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Hirschmann, Carl, Co., New Britain-Gridley Mch. Div., New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn. Prott & Whitney, West Hartford 1, Conn. Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Tomkins-Johnson Co., Jackson, Mich. Union Twist Drill Co., Athol, Mass. Universal Engrg. Co., Frankenmuth, Mich. Warner & Swasey Co., 5701 Carnegle Ave., Cleveland 3, Ohio.
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

COMPARATORS

See Gages, Comparator.

COMPARATORS, Optical

DoAll Co., 254 Laurel Ave., Des Plaines, Ill. Eastman Kodak Co., Rochester, N. Y. Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. Jones & Lamson Mch. Co., Springfield, Vt. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

COMPOUNDS, Cleaning

Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa. Oakite Products, Inc., 19 Rector St., New York, N. Y.

COMPOUNDS, Cutting, Grinding, Metal Drawing, Etc.

Cities Service Oil Co., 70 Pine St., New York, Cities Service Oil Co., 70 Fine S., 9.

N. Y.
Gulf Oil Corp., Gulf Bldg., Pittsburgh, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave.,
Philadelphia, Pa.
Johnson, S. C., & Son, Inc., Carnu St., Racine,
Wis.
National Broach & Mch. Co., 5600 St. Jean
Ave., Detroit 2, Mich. (Broaching & Lapping).
Oakite Products, Inc., 19 Rector St., New York,
N. Y.

Sel. Co., 50 West 50th St., New York, N. Y. Shell Oil Co., 50 West 50th St., New York, N. Y. N. Y.
Sinclair Refining Co., 630 5th Ave., New York.
Standard Oil Co. (Indiana), 910 S. Michigan,
Chicago, III.
Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St.,
Chicago 23, III.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Texas Co., 135 E. 42nd St., New York, N. Y.
Tide Water Associated Oil Co., 17 Battery
Place, New York, N. Y.

The

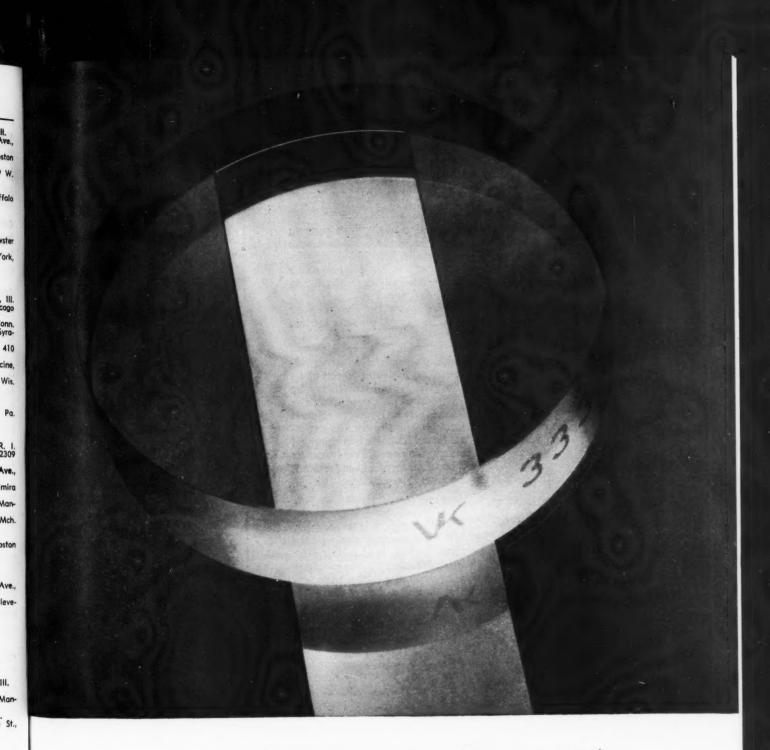
testi

THE

COMPOUNDS, Resin and Molding

Bakelite Co. Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y. General Electric Co., Schenectady 5, N. Y.

(Continued on page 292)



Two grooves each .00001" deep on an amplifying gage anvil.

Do your amplifying gages tell the truth?

A SET OF VAN KEUREN OPTICAL FLATS

will tell the story instantly

The Van Keuren 1952 Catalog and Handbook No. 35 gives complete details on testing flatness with optical flats and solutions of many other measuring problems.

Write for your copy.

THE PAR POTTON

Ave.,

York,

tal

York,

York, York, igan,

St.,

CO.,

178 WALTHAM STREET, WATERTOWN, MASS.

33rd YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blacks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires

IMPERSONAL INSPECTION DIAL COMPARATORS

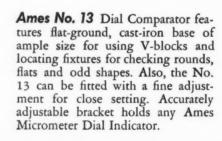
Ames Dial Comparators make the inspection of duplicate parts an extremely simple, rapid and accurate operation. Ames Comparators are strictly impersonal in their accuracy - the results being in no way dependent on the skill or judgment of the operator. The pressure of the gauging members against the work is mechanically determined and therefore uniform.

> Check the Ames Dial Comparators shown — one of them may solve a Quality Control problem for you.

Ames No. 1 Dial Comparator is an easily adjustable bench model that measures objects up to 2" in cross section. The table bracket may be quickly located and locked in position on the column. The table itself may be further positioned and locked for final fine adjustment. This comparator is designated Ames No. 1W when equipped with dead-weight contact pressure and contact area to ASTM specifications for measuring resilient materials, such as rubber, plastics, etc.



Ames No. 2 Dial Comparator is a compact, stable bench model for measuring non-yielding materials - sheet metal, glass, hard rubber. The 2" diameter table is adjustable to bring pointer to zero. Ames No. 2W is similar to the Ames No. 2, but is furnished with dead-weight contact pressure and contact areas to ASTM specifications for checking textiles, plastics, sheet rubber, etc.





Ames No. 130 Dial Comparator is designed especially for inspecting comparatively large parts. For this reason, the flat-ground steel base, the adjustable indicator support on which can be mounted any Ames Micrometer Dial Indicator, and the upright column are proportioned to suit the user's particular requirements.

Send us your Quality Control job specifications, and we will supply complete details and proposal without obligation,

B. C. AMES CO. Waltham 54, Mass. 27 Ames Street Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

COMPRESSORS, Air

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Ingersoll-Rand Co., Phillipsburg, N. J.

CONTOUR FOLLOWER

Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Turchan Follower Machine Co., 8259 Livernois and Alaska Aves., Detroit, Mich.

CONTRACT WORK

Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass. Blanchard Mch. Co., 64 State St., Cambridge, Mass.
Columbus Die, Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio.
Diefendorf Gear Corp., 920 N. Belden Ave., Syracuse, N. Y.
Eisler Engrg. Co., Inc., 760 S. 13th, Newark 3, N. J.
Fellows Gear Shaper Co., Springfield, Vt.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit Mich.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Hill Acme Co., 1201 W. 65th St., Cleveland, O. Maryland Precision Instrument Co., 12 E. Lanvale St., Baltimore 2, Md.
Minster Machine Co., Minster, Ohio.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

Morse Twist Drill & Mch. Co., New Bedford, Mass.

Mummert-Dixon Co., Hanover, Pa.

National Acme Co., 170 E. 131st St., Cleveland, Ohio.

Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, Ill.

Sheffield Corp., 721 Springfield, Dayton, Ohio. Taft-Peirce Mfg. Co., Woonsocket, R. I.

U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

Wicaco Machine Corp., Stenton Ave. and Louden St., Philadelphia, Pa.

CONTROLLERS

Allen-Bradley Co., 1326 S. 2nd St., Milwaukee, Wis. Arrow-Hart & Hegeman Elec. Co., Hartford 6, Conn. Bristol Co., Platts Mills, Waterbury, Conn. General Electric Co., Schenectady 5, N. Y.

CONVEYORS FOR DUST, CHIPS, ETC.

Hapman Conveyors, Inc.

COUNTERBORES

COUNTERBORES

Adamas Carbide Corp., 999 South 4th St., Harrison, N. J.
Allen Mfg. Co., 133 Sheldon St., Hartford 2, Conn.
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York.
Kennametal, Inc., Latrobe, Pa.
National Tool Co., 11200 Madison Ave., Cleveland, Ohio.
National Twist Drill & Tool Co., Rochester, Mich.
Praft & Whitney, West Hartford 1, Conn.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Starretf, The L. S., Co., Athol, Mass.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Threadwell Tap & Die Co., 16 Arch St., Green-Starrett, A. Starrett, A. Starrett, A. Starrett, A. Super Tool Co., 21650 Hoover No., Mich.
Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass.
Union Twist Drill Co., Athol, Mass.
Willey's Carbide Tool Co., 1340 W. Vernot Hwy., Detroit 1, Mich.

COUNTERSHAFTS

Standard Pressed Steel Co., Jenkintown, Pa.

COUNTERSINKS

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

(Continued on page 294)



1.

TC.

reen-

ernor

Pa.

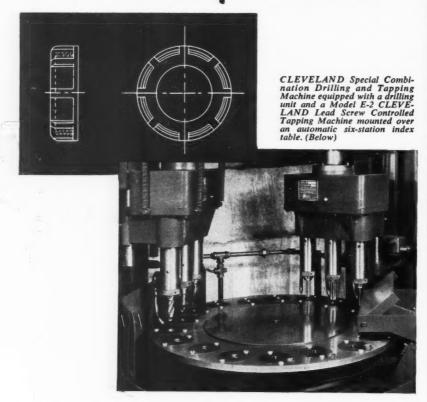
St.

troit

tapping machines

lead screw

2919 Pieces per Hour!



Here is an unbeatable combination for a manufacturer who must save valuable working time and cut production costs...a CLEVELAND combination drilling and tapping machine with three spindle multiple heads on each unit for core drilling or reaming and tapping three parts at one time. This particular CLEVELAND machine turns out 2919 ½" bushings per hour at 100% efficiency. Your own tapping problem may not involve the production of bushings but CLEVELAND engineers have the know-how and engineering experience to design and build for your plant tapping machines which will cut costs and increase production. They invite your inquiries without obligation on your part. Write today for your copy of Cleveland Catalog V-18.

Mr. Lead Screw says:



you need to perform any of these operations: Core Drilling... Reaming... Tapping... Threading... Chamfering. Cleveland engineers can show you how to effect economies in these operations. Cleveland Tappers have ALL the features you want.



THE CLEVELAND TAPPING MACHINE CO.
A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.
CANTON 6, OHIO



Gorham Tool Co., 14400 V/oodrow Wilson, Detroit, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Twist Drill & Tool Co., Rochester, Mich.
Severance Tool Industries, Inc., 636 lowa Ave., Saginaw, Mich.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Union Twist Drill Co., Athol, Mass.

COUNTERS, Revolution

Bristol Co., Platts Mills, Waterbury, Conn. Brown & Sharpe Mfg. Co., Providence, R. I. Millers Falls Co., Greenfield, Mass. Starrett, The L. S., Co., Athol, Mass. Veeder-Root, Inc., 20 Sargent St., Hartford

COUNTING DEVICES

Starrett, The L. S., Co., Athol, Mass. Veeder-Root, Inc., 20 Sargent St., Hartford, Conn.

COUPLINGS, Flexible

Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn. Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Pa.

COUPLINGS, Shaft

Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio. Standard Pressed Steel Co., Jenkintown, Pa.

CRANES, Electric Traveling

Cleveland Crane & Engrg. Co., Wickliffe, Ohio. Morgan Engrg. Co., Alliance, Ohio. Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES, Hand Traveling

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CUTTER GRINDERS

See Grinding Machines, for Sharpening Cutters, Reamers, Hobs, Etc.

CUTTERS, Gear

Brown & Sharpe Mfg. Co., Providence, R. I. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 6, Mich.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Michigan Tool Co., 7173 E. McNichols Rd., Detroit 12, Mich.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich. (Shaving).
National Tool Co., 11200 Madison Ave., Cleveland, Ohio.
National Twist Drill & Tl. Co., Rochester, Mich. Pratt & Whitney, West Hartford 1, Conn. Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Union Twist Drill Co., Athol, Mass.
Waltham Mch. Wks., Newton St., Waltham, Mass.
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

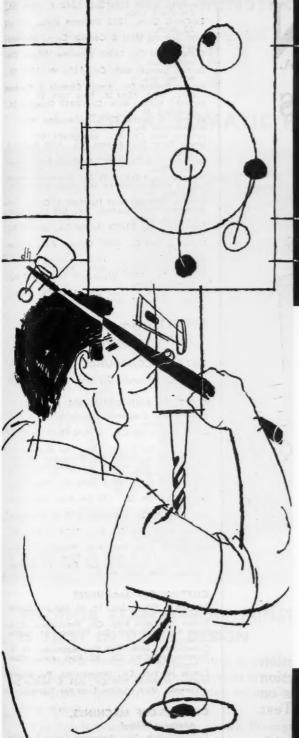
CUTTERS, Keyseater

Davis Keyseater Co., 225 Mill St., Rochester, N. Y.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Keo Cutters, 19326 Woodward, Detroit, Mich.
Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass.
Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

CUTTERS, Milling

Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn.
Atrax Co., Newington, Conn.
Barber-Colman Co., Rock St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.

(Continued on page 296)



ord,

ve., eve-13,

l.

ord

ord,

An-St.,

lier,

a.

hio

tou

tour

ing

t 6,

ing-

Rd.,

ord, ean eveich. eve-

am,

vd.,

ter

roit

Deich.

vd..

St.,

. I.

CALL YOUR DISTRIBUTOR FOR MORE INFORMATION OR WRITE CINCINNATI DIRECT.

> RADIAL DRILLS SENSITIVE AND UPRIGHT DRILLS JIG BORERS AUTOMATIC POSITIONING MACHINES SENSITIVE RADIAL DRILLS

THE FOSDICK MACHINE TOOL COMPANY

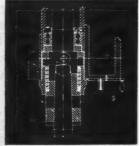
CINCINNATI 23, OHIO

ARE YOU IAMMERING. YOUR DRILL TOOLS INTO THE SCRAP PILE?

Tools on the scrap pile mean profits out the window. Then why let drills be pounded into scrap by the old-fashioned hammer-and-drift method of removal?

Fosdick Drills, equipped with Tool Ejectors, eliminate the need for hammers and drifts. The operator simply engages the Tool Ejector, grasps the tool with one hand and withdraws the spindle with the other. There's virtually no possibility of tool points striking the table. Operators save the time formerly spent groping for unnecessary tools. Drill, tap and reamer shanks stay smooth, keep your tools running right on center.

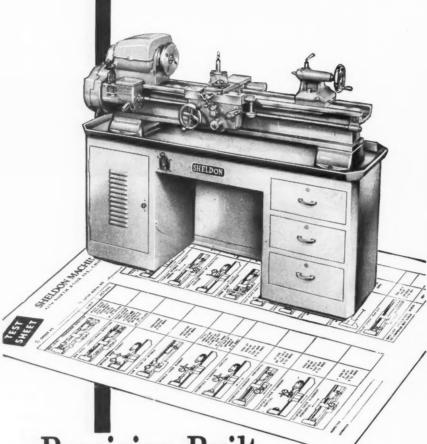
You don't need attachments—it's all done without special chucks, using standard taper shank tools.



THE TOOL EJECTOR is another "first" from Fosdick, design leader in drilling machinery, and first to apply hydraulics to Radial Drill controls. Remember, only Fosdick can equip its drills with the Tool Ejector.



Tool Room Lathes



Precision Built for Precision Work

> Each SHELDON Lathe is a precision machine tool that in final inspection has passed the 19 accuracy checks on the SHELDON "Inspection Test Sheet".

> Produced by modern methods with the finest special machines, these 10", 11" and 12" (swings 13") lathes are quality built on a quantity production basis. Selling at quantity production prices they are today's best lathe values.

Write for Catalog with Test Sheet

SHELDON MACHINE CO., INC.

4246 North Knox Ave., Chicago 41, Illinois

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Firth Sterling Steel & Carbide Corp., McKeesport, Pa. Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich. Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis. Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y. Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill. Kearney & Trecker Corp., Milwaukee, Wis. Kennametal, Inc., Latrobe, Pa. Lovejoy Tool Co., Inc., Springfield, Vt. Morse Twist Drill & Mch. Co., New Bedford, Mass. Mass. National Tool Co., 11200 Madison Ave., Cleve-National Tool Co., 11200 Madison Ave., Cleveland, Ohio.

National Twist Drill & Tl. Co., Rochester, Mich. Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.

Pratt & Whitney, West Hartford 1, Conn. Severance Tool Industries, Inc., 636 lowa Ave., Saginaw, Mich.

Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

Mich.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Tomkins-Johnson Co., Jackson, Mich.
Union Twist Drill Co., Athol, Mass.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.
Willey's Carbide Tool Co., 1340 W. Vernor
Hwy, Detroit I, Mich.

CUTTERS, Rotary

See Files and Burs, Rotary.

CUTTING COMPOUNDS

See Compounds, Cutting, Grinding, Etc.

CUTTING AND GRINDING FLUIDS

Cimcool Div., Cincinnati Milling Mch. Co., Cincinnati, Ohio.
Cities Service Oil Co., 70 Pine St., New York, N. Y.
DoAll Co., 254 Laurel Ave., Des Plaines III N. Y.
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.
Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave.,
Philadelphia, Pa.
Shell Oil Co., 50 West 50th St., New York,
N. Y.
Singlair Pe N. Y. Sinclair Refining Co., 630 5th Ave., New York, Standard Oil Co. (Indiana), 910 S. Michigan, Standard Oil Co. (Indiana), YIU S. Micnigun, Chicago, III. Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St., Chicago 23, III. Sun Oil Co., 1608 Walnut St., Philadelphia, Pa. Texas Co., 135 E. 42nd St., New York, N. Y. Tide Water Associated Oil Co., 17 Battery Place, New York, N. Y.

CUTTING-OFF MACHINES

Bardons & Oliver, Inc., Ft. W. 9th St., Cleveland 13, Ohio.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Mch. Co., Windsor, Vt. (Lathe Type). Consolidated Mch. Tool Co., Rochester, N. Y. Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y. Landis Machine Co., Waynesboro, Pa. (Pipe). Modern Machine Tool Co., 601 S. Water St., Jackson, Mich. (Lathe Type for Tubing).

CUTTING-OFF MACHINES, **Abrasive Wheel**

Campbell Mch. Div., American Chain & Cable 929 Conn. Ave., Bridgeport, Conn.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.

CUTTING-OFF MACHINES, Cold Saw

See Sawing Machines, Circular.

CUTTING-OFF MACHINES, **Metal Band Saws**

Armstrong-Blum Mfg. Co., 5700 W. Blooming-dale Ave., Chicago, III. DoAII Co., 254 Laurel Ave., Des Plaines, III. Grob Bros., Grafton, Wis.

CUTTING-OFF TOOLS

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. (Continued on page 300)

296-MACHINERY, August, 1952

THE NEW MINSTER

t.,

t.,

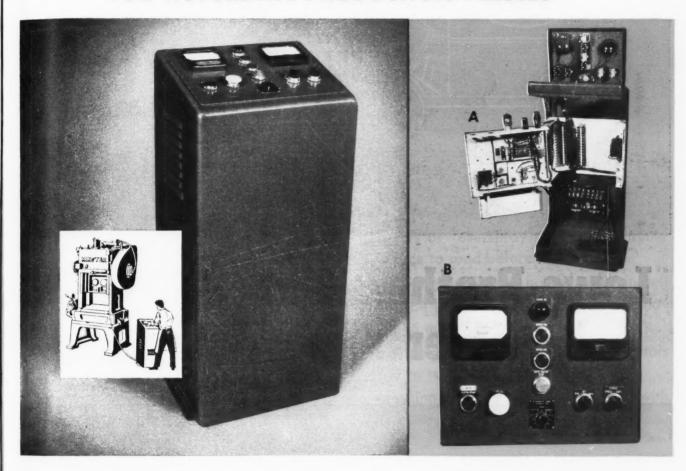
C.

III.

t.,

PULPIT CONTROL

FOR AUTOMATIC PRODUCTION PRESSES



ANOTHER REASON WHY MINSTER IS FIRST IN PRESS DESIGN

The Minster designed Pulpit Control is simple and easy to operate. Continuous pressure lubrication system pump motor and variable speed drives are started automatically with the drive motor.

The Pulpit Control is easier to service. Photograph at right shows the extreme accessibility to all interior parts.

The Pulpit Control is more convenient, particularly where there are cramped quarters.

The Pulpit Control is *flexible*. Control can be used with pendant clutch control . . . without variable speed drive, tachometer, and other control features with flexible or rigid conduit.

Consider this new Minster designed Pulpit Control on your next Minster automatic production presses. Here is another indication that when you specify Minster you specify the finest in press equipment.

THE MINSTER MACHINE CO., MINSTER, OHIO

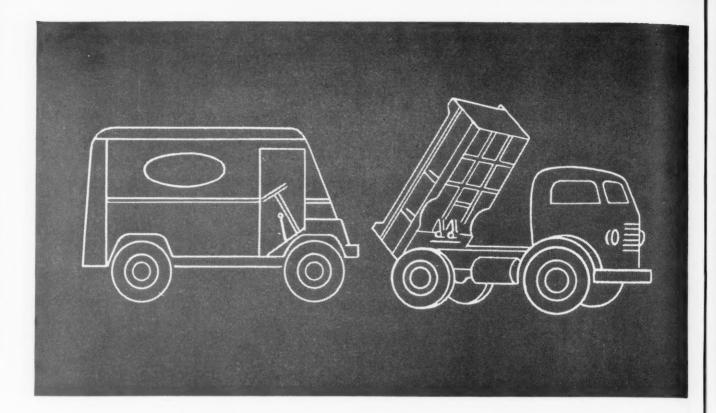
A—Unusual Accessibility

This rear view shows the control with side and back panels removed, instrument panel hinged upward, and the cover of interior electronic drive units swung open. In three minutes the entire assembly can be made 100% accessible.

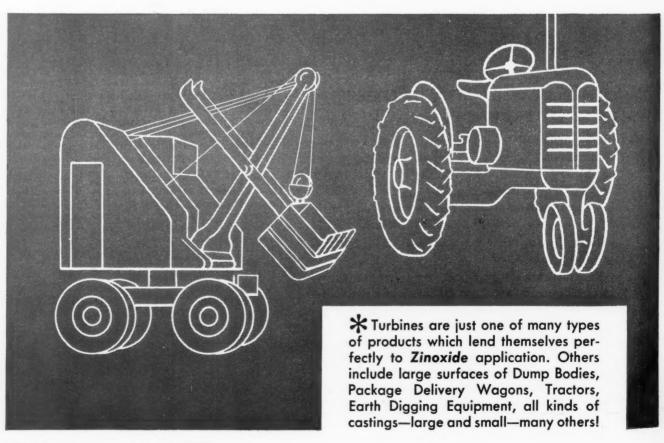
B—11 Remote Controls and Instruments

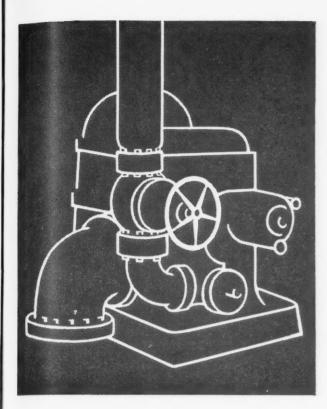
This close-up view shows the completeness of the remote control system on the new Minster Pulpit Control. Instruments include main motor control push button and starter...selector switches... tachometer indicator... ampere indicator... press start and top stop push buttons... speed adjustment potentiometer for variable speed drive.





Lowe Brothers New ZINOXIDE problems of conventional





overcomes the metal primers



on facts from Lowe Brothers industrial case history files.

Cuts finishing costs! -

Having proved its superiority through several years of extreme testing ... on every type of surface, in all climates . . . Lowe Brothers "Finishing Specialists" proudly offer Zinoxide for general industrial consumption. One series of Zinoxide tests was made by a large turbine manufacturer* who now uses it in place of a primer he had been using for 10 years. His tests proved that Zinoxide dried faster, gave a smoother surface, eliminated sanding, and had much greater durability!

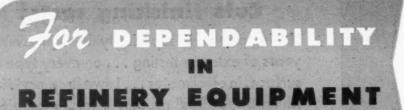
Here are outstanding features of Lowe Brothers Zinoxide which assure better finishing results and effect new economies:

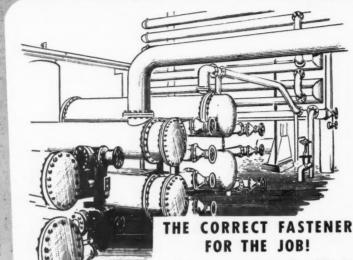
- Eliminates the conventional bad aftereffects of "overspray"-no rough primer surface to sand before finishing.
- Quick drying! Dries to handle in 15 minutes!
- Can be baked at a temperature of 300° for 15 minutes or more.
- Pigments used are the best rust inhibitors known to the paint industry.
- Amazingly durable—castings primed with Zinoxide can be stored outside—exposed to the elements for long periods if necessary!
- Can be recoated quickly with lacquer or with any type of enamel.

If you're interested in eliminating some costly finishing problems, call on a Lowe Brothers "Finishing Specialist" for additional factual evidence of Zinoxide's superior qualities. Then put it to the test yourself! Write today.

THE LOWE BROTHERS COMPANY . Dayton 2, Ohio Industrial Division

Lowe Brothers





Precision and Quality Workmanship, backed up by 38 years of Erie experience, are yours for thoughtful buying. Whether you require a fastener made from carbon, alloy or stainless steels, to special design, to exacting specifications,

> Erie fasteners will save you time and expense . . . from your planning, to procurement, to fabrication. Submit your fastener requirements to us, Erie Service will meet the challenge.





BOLT and NUT CO. PENNSYLVANIA

e BOLTS STUDS · STAINLESS ALLOYS BRONZE CARBON

Representatives in Principal Cities.

DoAll Co., 254 Laurel Ave., Des Plaines, Ill.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carbon
Corp., 30 E. 42nd St., New York, N. Y.
Kennametal, Inc., Latrobe, Pa.
Luers, J. Milton, 12 Pine St., Mt. Clemens,
Mich.
Pratt & Whitney, West Hartford 1, Conn.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.
Williams, J. H., & Co., 400 Vulcan St., Buffalo
7, N. Y.

CUTTING-OFF WHEELS, Abrasive

Bay State Abrasive Co., Westboro, Mass. Carborundum Co., Buffalo Ave., Niagara Falls, Norton Co., 1 New Bond St., Worcester, Mass.

CYLINDER BORING MACHINES

Baker Bros., Inc., Sta. F, P. O. Box 101, Toledo 10, Ohio.
Barnes Drill Co., 814 Chestnut, Rockford, Ill. Consolidated Mch. Tool Corp., Rochester, N. Y. Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill. Moline Tool Co., 102 20th St., Moline, Ill.

CYLINDERS, Hydraulic

Barnes, John S., Corp., Rockford, III. Hanna Engineering Works, 1752 Elston Ave., Chicago, III. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III.
Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
Mt. Gilead, Ohio.
National Forge & Ordnance Co., Irvine, Warren
County, Pa.
Oilgear Co., 1560 W. Pierce St., Milwaukee 4,
Wis. Wis.
Rivett Lathe & Grinder, Inc., Brighton, Boston
35, Mass.
Rockford Machine Tool Co., 2500 Kishwaukee
St., Rockford, III.
Tomkins-Johnson Co., Jackson, Mich.

CYLINDERS, Pneumatic

Hanna Engineering Works, 1752 Elston Ave., Chicago, III. Hannifin Corp. 1101 S. Kilbourn Ave., Chicago, Mead Specialties Co., 4114 North Knox Ave., Chicago 41, III. Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass. Tomkins-Johnson Co., Jackson, Mich.

DEALERS, Machinery

Botwinik Bros. of Mass., Inc., 14 Sherman St., Worcester, Mass.
Earle Gear & Mch. Co., 4707 Stenton Ave., Wayne Junction, Philadelphia 44, Pa. Motch & Merryweather Mchry. Co., Penton Bldg., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.
Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.

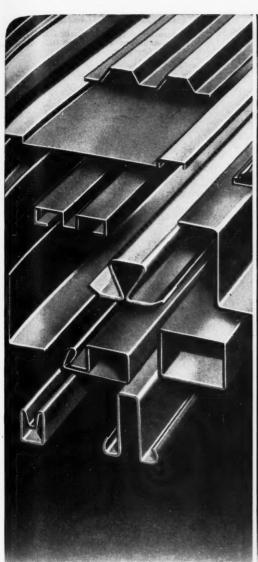
DEMAGNETIZERS

Blarichard Mch. Co., 64 State St., Cambridge, Mass. Heald Mch. Co., 10 New Bond St., Worcester 6, Mass. Walker, O. S., Inc., Worcester, Mass.

DESIGNERS, Machine and Tool

Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Pioneer Engrg. & Mfg. Co., 19679 John R St., Detroit, Mich.
Pioneer Pump & Mfg. Co., 19679 John R St., Detroit, Mich.
Pratt & Whitney, West Hartford 1, Conn.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.
Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

(Continued on page 302)



, De-

Slvd.,

Falls

oledo

, III. N. Y. Aich.

St.,

Ave., ago, Ave., arren ee 4, eston ukee

ago, ve., ston

ve.,

nton

St.,

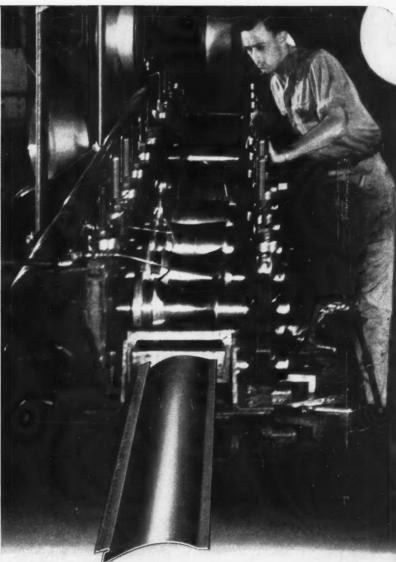
vay,

ige,

r 6,

St.,

roit



Metal Lumber by the Mile!

Not only rough but finished "lumber," mouldings and trim, are made in an endless stream on a Yoder Cold Roll Forming machine, from coiled metal strip.

The photo shows the production of siding by Kaiser Aluminum and Chemical Corporation, Oakland, Calif. The strip goes in at one end, is perforated and formed, coming out at the other as finished siding, automatically cut to length, ready for installation.

As a matter of fact, almost anything that can be made from lumber can now be made more accurately, better and more cheaply from metal, by this method. Plain steel angles, channels and Z's up to ½" thick, take the place of conventional framing lumber. More intricate shapes, combining structural strength with decorative value, serve for mouldings, panels and trim.

Billions of feet are now made annually on Yoder machines, owned by manufacturers of buildings and their components, furniture, electric appliances, automotive equipment, etc.

Yoder book on the function, scope and economics of Cold Roll Forming, sent on request. Consultations and estimates for the asking.

THE YODER COMPANY • 5504 Walworth Ave., Cleveland 2, Ohio

Complete Production Lines

- * COLD-ROLL-FORMING and auxiliary machinery
- * GANG SLITTING LINES for Coils and Sheets
- * PIPE and TUBE MILLS-cold forming and welding





BRISTOL'S SOCKET SCREWS

Order BRISTOL'S SOCKET SCREWS Hex and Multiple-Spline...cap and set styles from your distributor. The Strength of CUSTOM-MADE for the Price of "Regular"

FREE SAMPLES and socket screw catalog. Address THE BRISTOL COMPANY, Mill Supply Division, 161 Bristol Road, Waterbury 20, Conn.

DIAMONDS AND DIAMOND TOOLS

Meyers, W. F., Co., Bedford, Ind. Precision Diamond Tool Co., 102 South Grove Ave., Elgin, III.

DIE-CASTING

See Castings, Die.

DIE-CASTING MACHINES

British Industries Corp., International Mchry. Div., 164 Duane St., New York, N. Y. Hydraulic Press Mfg. Co., Mt. Gilead, Ohlo, Hydropress, Inc., 350 Fifth Ave., New York I, N. Y. N. Y.
Kux Machine Co., 3930 W. Harrison St.,
Chicago, III.
Lake Erie Engineering Corp., Kenmore Station,
Buffalo, N. Y.
Reed-Prentice Corp., 677 Cambridge St., Wor-

DIE CUSHIONS

cester, Mass.

Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio. Clearing Mch. Corp., 6499 W. 65th St., Chi-Clearing Mcn. Corp., 0457 Th. Sain Sin, Cago, III.
Dayton Rogers Mfg. Co., 2824 13th Ave., S.,
Minneapolis 7, Minn.
Verson Allsteel Press Co., 93rd St. and S.
Kenwood Ave., Chicago, III.

THIS

Rolling

Re

Fed numb

makin

qualit

Thi to me invent produ

tenan

there' "mill short To Fenn

stalla of ma

ATLAMI
J. R. Wo
BALTIM
Refer: C.
BIRMIN
Quinn &
BOSTOI
Refer: C.
BUFFAL
Syracuse
GHICAG
Neff Kol
GINCIN
The Seif
Co.
GLEVEL
Wm. K.:
COLUM
The Seif

DIE INSERTS, Carbide

Adamas Carbide Corp., 999 South 4th St., Harrison, N. J.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Kennametal, Inc., Latrobe, Pa.
Wetal Carbides Corp., Youngstown, Ohio.
Willey's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich.

DIEMAKERS' SUPPLIES

Allied Products Corp., 12677 Burt Rd., Detroit Allied Products Corp., 126/7 Burt Rd., Detroit 23, Mich.
Danly Mch. Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, III.
Detroit Die Set Corp., 2895A W. Grand Blvd., Detroit 2, Mich.
Producto Mch. Co., 990 Housatonic Ave., Bridgeport, Conn.
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

DIEMAKING MACHINES

Grob Bros., Grafton, Wis. Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. Kearney & Trecker Corp., Milwaukee, Wis. Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.

DIE SETS, Standard

Danly Mch. Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, III.
Detroit Die Set Corp., 2895A W. Grand Blvd., Detroit 2, Mich.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Producto Mch. Co., 990 Housatonic Ave., Bridgeport, Conn.
Wales-Strippit Corp. North Tangwanda N. Y. Wales-Strippit Corp., North Tonawanda, N. Y.

DIE-SINKING MACHINES

American Steel Foundries, Elmes Engrg. Div. Paddock Rd. and Tennessee Ave., Cincinnati, Ohio. Cincinnati Milling Mch. Co., Cincinnati, Ohio. Gorton, George, Machine Co., 1110 W. 13th St., Racine, Wis.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Pratt & Whitney, West Hartford 1, Conn. Reed-Prentice Corp., 677 Cambridge St., Worcester, Mass. cester, Mass.

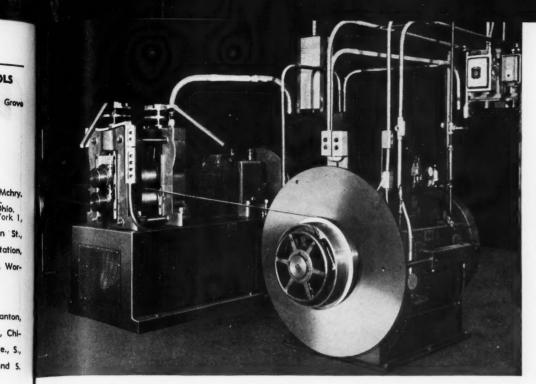
DIE-SINKING PRESSES

Baldwin-Lima-Hamilton Corp., Philadelphia 42. Kearney & Trecker Corp., Milwaukee, Wis.

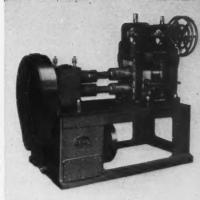
DIE STOCKS

See Stocks, Die.

(Continued on page 304)



THIS FENN COMBINATION, consisting of the new No. 061 Two-High Roller Bearing Rolling Mill and No. 30 Take-Up Reel, installed at Federal-Mogul's St. Johns, Michigan Plant...



GREATER ACCURACY of the new No. 061 Two-High Rolling Mill comes from heavier roll construction made possible by Fenn-designed extraheavy precision roller bearings. Roller thrust bearings on outer bearing boxes maintain axial alignment, eliminating marks or "shadows" on the stock Universal joint and herringbone gears provide smoother drive from motor through to rolls, for smoother finish of

Reduces Inventory...Saves Maintenance CUTS COSTS

Federal-Mogul is one of the growing number of forward-looking firms that are making sure of an adequate supply of topquality strip by "rolling their own."

) c

n St., 1, Pa. 237, h. Kees-

ernor

etroit 52nd Blvd. Ave.,

, Am-

Man

s. St.,

Ave.

Blvd.,

Man-

Ave.

1. Y.

Nor-

42.

This way, they roll one stock thickness to meet many needs, thus reducing stock inventory . . . the more accurate strip they produce speeds production and saves maintenance on fabricating machines ... and there's further economy in eliminating such "mill extras" as set-up, inspection and

To get these benefits at their fullest, Fenn units are the obvious choice. The installation shown above, for example, is one of many typical Fenn combinations for the production of ferrous or non-ferrous stripat top speed and lowest cost.

GET THE WHOLE STORY

Fenn Roller Bearing Rolling Mills are available in Two-High and Four-High models, with roll diameters from 4" to 16", single or tandem units, speeds up to 2,000 ft. per min. Fenn Take-Up Reels are made in a range of sizes for either traversing or "pancake" winds. For full information about their many cost-saving, efficiencyboosting advantages, contact your nearest Fenn Distributor, or write direct to

THE FENN MANUFACTURING COMPANY

1857 Broad St., Hartford 1, Connecticut

ROCHESTER



FASTER REMOVAL of finished coil is one big advantage of Fenn's No. 30 Take-Up Reel — resulting from such design-improvements as collapsing drum and hydraulic stripper. Having a capacity of 3,000 lbs. of coil, while providing a tension of 2,500 lbs., it combines with the Fenn Mills to handle up to 2,000 ft. of strip per min.



Forming metal for better and stronger products at lower cost

FENN MACHINES ARE SOLD BY:

Cacuse Supply Co. eff Kohlbusch & Bissell, Inc. IHCINNATI le Seifreat-Elstad Machinery Nm. K. Stam

ATLANTA
J. R. Walraven
ALTIMORE
Refer: Calco Mach'y Co., Phila.
BIRMINGHAM
Quinn & Quinn
Roston
Refer: C. Toolin, Providence
BUFFALO
Joseph Monahan

ATLANTA
DALLAS
C. J. Harter, Machinery
DAYTON
The Seifreat-Elstad Machinery
DEFROIT
The Chas. A. Strelinger Co.
GRAND RAPIDS
Joseph Monahan Joseph Monahan
HOUSTON
C. J. Harter, Machinery
INDIANAPOLIS
State Machinery Co. State Machinery Co.
KANSAS CITY, MO.
Robt. R. Stephens Machiner LOS ANGELES

Co. NEW ORLEANS Stauss & Haas, Inc. NEWARK NEWARK
A. C. Cook
NEW YORK
The Silvers Machinery Co.
NORFOLK
Tidewater Supply Co. Inc.
PHILADELPHIA
Calco Machinery Co.
PHOEMIX
Hoffman & Hearth PITTSBURGH Wm. K. Stamets Co. PROVIDENCE Charles Toolin

SAN FRANCISCO C. F. Bulotti Machinery Co. ST. LOUIS
Robt. R. Stephens Machinery
Co. SEATTLE SYRACUSE CANADA MONTREAL, QUEBEC TORONTO, WINDSOR Williams & Wilson Ltd FOR EXPORTS Indianapolis Machinery Export Co., Inc., New York, N. Y.

DIES, Sheet Metal, Etc.

23, Mich. Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio. Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio. Allied Products Corp., 12677 Burt Rd., Detroit

land 3, Ohio.
Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio.
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. Chambersburg Engrg. Co., Chambersburg, Pa. Columbus Die, Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio.
Dreis & Krump Mfg. Co., 7416 Loomis Blvd., Chicago 36, III.
Ferracute Mch. Co., Bridgeton, N. J. John, B., Manufacturing Co., Ellis St., New Britain, Conn.
Metal Carbides Corp., Youngstown, Ohio.
Niagara Mch. & Tool Wks., 683 Northland Ave., Buffalo, N. Y.
Pioneer Pump & Mfg. Co., 19679 John R St., Detroit, Mich.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
V & O Press Co., Div. Emhart Mfg. Co., Hudson, N. Y.

Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, III. Wales-Strippit Corp., North Tonawanda, N. Y. Waltham Mch. Wks., Newton St., Walthan,

DIES, Threading

Butterfield Div., Union Twist Drill Co., Derby

Line, Vt.
Card, S. W., Mfg. Co., Mansfield, Mass.
Detroit Tap & Tool Co., Detroit, Mich.
Eastern Mch. Screw Corp., New Haven, Conn.
Geometric Tool Co., Westville Station, New
Haven 15, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hill Acme Co., 1201 W. 65th St., Cleveland 2,

Ohio. orse Twist Drill & Mch. Co., New Bedford, Mass

National Acme Co., 170 E. 131st St., Cleveland,

National Active Co., West Hartford 1, Conn. Ohio.
Prott & Whitney, West Hartford 1, Conn. Sheffield Corp., 721 Springfield, Dayton, Ohio. Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.

Inreadwell Tap & Die Co., 16 Arch St., Greenfield, Mass. Winter Bros. Co., Rochester, Mich.

DIES, Threading, Opening

Eastern Mch. Screw Corp., New Haven, Conn. Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N., Geometric Tool Co., Westville Station, New Geometric Tool Co., Westville Station, New Haven 15, Conn. Hill Acme Co., 1201 W. 65th St., Cleveland 2, Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt. Landis Mch. Co., Waynesboro, Pa. National Acme Co., 170 E. 131st St., Cleveland,

Sheffield Corp., 721 Springfield, Dayton, Ohio.

DIES, Thread Rolling

Detroit Tap & Tool Co., Detroit, Mich. Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. Pratt & Whitney, West Hartford 1, Conn. Sheffield Corp., 721 Springfield, Dayton, Ohio.

DISCS, Abrasive

Besly-Welles Corp., Beloit, Wis. Carborundum Co., Buffalo Ave., Niagara Falls, N. Y. N. Y.
Gardner Machine Co., 414 E. Gardner St.,
Beloit, Wis.
Norton Co., 1 New Bond St., Worcester, Mass.
Simonds Abrasive Co., Tacony & Fraley Sts.,
Bridesburg, Philadelphia, Pa.
Walls Sales Corp., 333 Nassau Ave., Brooklyn
22, N. Y.

DIVIDING HEADS

See Index Centers.

DOWEL PINS

Allen Mfg. Co., 133 Sheldon St., Hartford 2, Conn. Conn.
Danly Mch. Specialties, Inc., 2107 S. 52nd Ave.,
Chicago 50, III.
Detroit Die Set Corp., 2895A W. Grand Blvd.,
Detroit 2, Mich.
Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn. S. Tool Co., I Ampere, N. J. Inc., 255 North 18th St.,

DRAFTING MACHINES

Universal Drafting Mch. Corp., 7960 Lorain Ave., Cleveland, Ohio.

DRESSERS, Grinding Wheel

DRESSERS, Grinding Wheel
Carboloy Dept., General Electric Co., Box 237,
Roosevelt Park Annex, Detroit 32, Mich.
Erickson Tools Div. Erickson Steel Co., 2309
Hamilton, Cleveland, Ohio.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
32, Mich.
Hoglund Engrg. & Mfg. Co., Inc., Berkeley
Heights, N. J.
Metal Carbides Corp., Youngstown, Ohio.
Meyers, W. F., Co., Bedford, Ind.
Moore Special Tool Co., Inc., 724 Union Ave.,
Bridgeport, Conn.
Norton Co., 1 New Bond St., Worcester, Mass.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Super Tool Co., 21650 Hoover Rd., Detroit 13,
Mich.

DRIFTS, Drill

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.

DRILL HEADS, Multiple Spindle

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio. Barnes Drill Co., 814 Chestnut, Rockford, Ill. Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.

N. Y. Canedy-Otto Div., Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.
Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor, Mich.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, S. I., N. Y.
Ettco Tool Co., Inc., 592 Johnson Ave., Brooklyn, N. Y.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Govro-Nelson Co.., 1933 Antoinette St., Detroit 8, Mich.

8, Mich.

8, Mich.
Moline Tool Co., 102 20th St., Moline, III.
Thriftmaster Products Corp., 1076 N. Plum St.,
Lancaster, Pa.
United States Drill Head Co., 616 Burns,
Cincinnati, Ohio.
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleve-

(Continued on page 306)





New d 2,

and, hio

io.

alls, St.,

lyn

2,

St.,

ain

37.

09

ley

11,

it

"Now you can clean hydraulic systems without interrupting production!"

Shell has developed a unique method of cleaning and dehydrating all classes of hydraulic systems. The Shell Cleaning Method does the job quickly and thoroughly . . . without wasting valuable production time. These are the highlights:

It's thorough ...

This tested method employs a special oil that can do a multiple cleaning job while your machines operate during a regular production shift.

It dehydrates ... removes sludge ...

The special cleaning oil will materially dehydrate wet sludges in a system and remove them . . . at the same time it has high solvency for products of oxidation. It coats critical surfaces with an effective rust preventive so that no part of the mechanism is unprotected while the cleaning oil is drained from the unit.

It costs little ...

The cost of using the Shell Cleaning Method is surprisingly low, since no expensive material nor equipment is required.

"...and when it's clean ...fill it with Shell's Improved Tellus Oil"



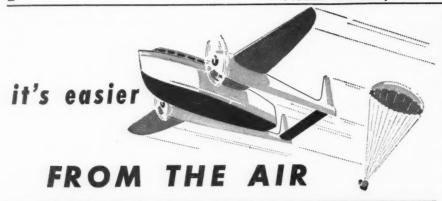
This is the one inhibited oil that:

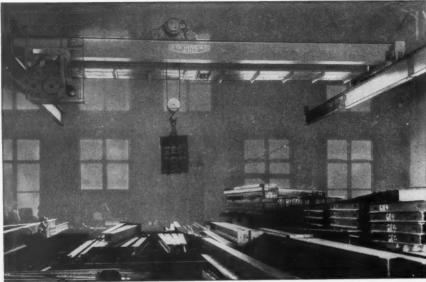
- 1. Prevents Rusting . . . with a new combination of rust inhibitors . . . licks the rust problem for good.
- 2. Reduces Foaming . . . even with minor air leaks in the system.
- 3. Excels in Oxidation Stability . . . prevents sludging and emulsion formation.
- 4. Prevents wear . . . maintains tenacious film of great strength at all times.

SHELL OIL COMPANY 50 West 50th Street, New York 20, N. Y., or 100 Bush Street, San Francisco 6, Cal.



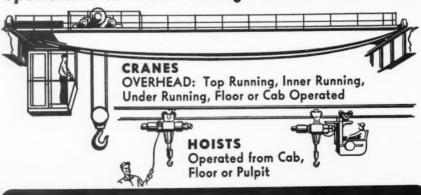
SHELL HYDRAULIC OILS





- Want to spot loads more accurately stack them higher? Then put this Shepard Niles Crane to work! From his vantage point, the operator can see where loads should go, then deliver them there directly.
- Little wonder so many plants use through-the-air handling — it's so fast, so easy, so economical. But which crane is best for your plant? The Shepard Niles representative is qualified to answer this question because he specializes in through-the-air handling. He knows the importance of installing the right equipment from the start. Write for Bulletin 180 today — and ask to have a representative stop by your office.

Specialists in loads through-the-air since 1903



AND HOIST CORPORATION

1519 SCHUYLER AVENUE . MONTOUR FALLS, N.Y.

DRILL HEADS, Unit Type

Barnes Drill Co., 814 Chestnut, Rockford, III.
Delta Power Tool Div., Rockwell Mfg. Co.,
614G N. Lexington Ave., Pittsburgh 8, Pa.
Drillunit, Inc., 635 Mt. Elliott, Detroit 7, Mich.
Kingsbury Mch. Tool Corp., Keene, N. H.
Rehnberg-Jacobson Mfg. Co., 2135 Kishwaukee
St., Rockford, III.
Snow Mfg. Co., 435 Eastern Ave., Bellwood, III.

DRILL SOCKETS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.
Greenfield Tap & Die Corp., Greenfield, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Twist Drill & Tool Co., Rochester, Mich. Pratt & Whitney, West Hartford 1, Conn. Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Union Twist Drill Co., Athol, Mass.

DRILL STANDS

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. Greenfield Tap & Die Corp., Greenfield, Mass. Morse Twist Drill & Mch. Co., New Bedford, Mass. National Twist Drill & Tool Co., Rochester, Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Union Twist Drill Co., Athol, Mass.

DRILLING MACHINES, Automatic

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio.
Barnes Drill Co., 814 Chestnut, Rockford, Ill. Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.
Bodine Corp., Mt. Grove St., Bridgeport, Conn. Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor, Mich. Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor, Mich.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Kingsbury Mch. Tool Corp., Keene, N. H.
Millholland, W. K., Machinery Co., 6402 Westfield Blvd., Indianapolis 5, Ind.
National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.
Wales-Strippit Corp., North Tonawanda, N. Y.
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

DRILLING MACHINES, Bench

Atlas Press Co., 1253 No. Pitcher St., Kalamazoo, Mich.
Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.
Canedy-Otto Div., Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.
Delta Power Tool Div., Rockwell Mfg. Co., 6146 N. Lexington Ave., Pittsburgh 8, Pa.
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.
Hamilton Tool Co., 834 South 9th St., Hamilton, Ohio.
Henry & Wight Div., Emhart Mfg. Co., 760
Windsor St., Hartford 1, Conn.
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass. Atlas Press Co., 1253 No. Pitcher St., Kalamacester, Mass.
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.
Walker-Turner Div., Kearney & Trecker Corp., South Ave., Plainfield, N. J.

DRILLING MACHINES, Boiler

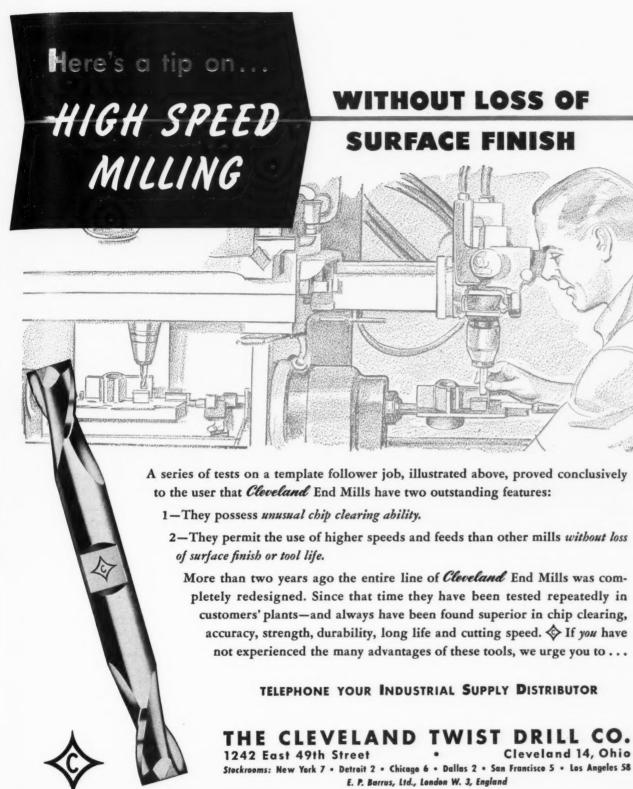
Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio. Foote-Burt Co., 1300 St. Clair Ave., Cleveland 8, Ohio.

DRILLING MACHINES, Deep Hole

Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
National Automatic Tool Co., Inc., S. 7th and
N Sts., Richmond, Ind.
Pratt & Whitney, West Hartford 1, Conn.
Wales-Strippit Corp., North Tonawanda, N. Y.

DRILLING MACHINES, Gang

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio. (Continued on page 308)



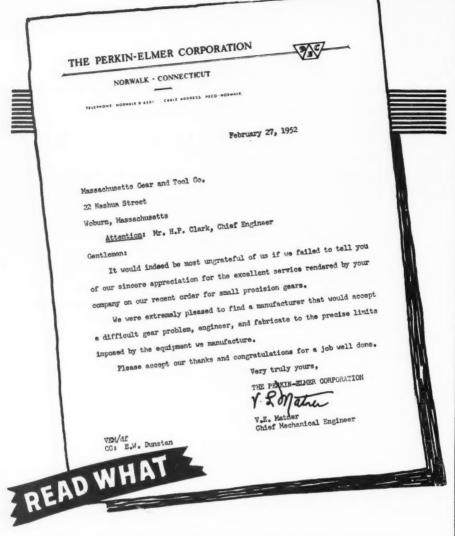
III.

ter,

s. ord,

01,





The PERKIN-ELMER CORPORATION,

Designers, Consultants and Manufacturers of optical equipment have to say about MASS GEAR'S engineering and manufacturing service.

ASK US FOR ASSISTANCE ON YOUR GEAR PROBLEMS. Illustrated Literature on Request.



Barnes Drill Co., 814 Chestnut, Rockford, III.
Baush Machine Tool Co., 156 Wason Ave.,
Springfield 7, Mass.
Cincinnati Bickford Tool Co., 3220 Forrer Ave.,
Cincinnati, Ohio.
Cleereman Mch. Tool Co., Green Bay, Wis.
Consolidated Mch. Tool Corp, Rochester, N. Y.
Delta Power Tool Div., Rockwell Mfg. Co.,
614G N. Lexington Ave., Pittsburgh 8, Pa.
Foote-Burt Co., 1300 St. Clair Ave., Cleveland
8. Ohio.

8. Ohio.
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, III.
Leland-Gifford Co., 1025 Southbridge St., Worcester Anges

cester, Mass.
Millholland, W. K., Mchry. Co., 6402 Westfield Blvd., Indianapolis 5, Ind.
Moline Tool Co., 102 20th St., Moline, Ill.
National Automatic Tool Co., Inc., S 7th and N Sts., Richmond, Ind.

DRILLING MACHINES. **Horizontal Duplex**

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio. Barnes Drill Co., 814 Chestnut, Rockford, III. Barnes, W. F. & John, Co., 201 S. Water St., Rockford, III. Barnes Drill Co., 814 Chestnut, Rockford, Ill. Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill. Baush Mch. Tool Co., 156 Wason Ave., Springfield 7, Mass.
Consolidated Mch. Tool Corp., Rochester, N. Y. Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis. Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa. Kingsbury Mch. Tool Corp., Keene, N. H. Millholland, W. K., Mchry. Co., 6402 Westfield Blvd., Indianapolis 5, Ind. Moline Tool Co., 102 20th St., Moline, Ill. National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind. Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

DRILLING MACHINES. **Horizontal Portable**

Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio.

DRILLING MACHINES, Inverted

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio. Barnes Drill Co., 814 Chestnut, Rockford, III. Baush Mch Tool Co., 156 Wason Ave., Spring-field 7, Mass. National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.

DRILLING MACHINES, Multiple Center Column Type

Barnes Drill Co., 814 Chestnut, Rockford, Ill. National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.

DRILLING MACHINES, Multiple Spindle

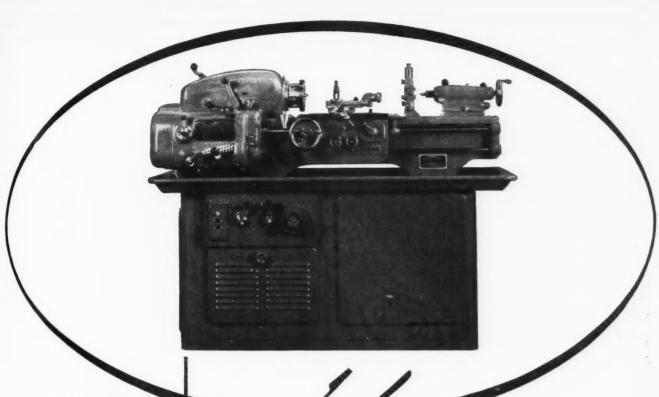
Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio.
Barnes Drill Co., 814 Chestnut, Rockford, III.
Barnes, W. F. & John, Co., 201 S. Water St., Rockford, III.
Baush Mch. Tool Co., 156 Wason Ave., Springfield 7 Rockford, III.
Baush Mch. Tool Co., 156 Wason Ave., Springfield 7. Mass.
Buffaro Forge Co., 490 Broadway, Buffalo, N.Y.
Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor,

Buffaro Forge Co., 490 Broadway, Buffalo, N. Y. Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor, Mich.

Burg Tool Manufacturing Co., 3743 Durango Ave., Los Angeles 34, Calif.
Canedy-Otto Div., Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.
Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio.
Cleereman Mch. Tool Co., Green Bay, Wis.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh & Pa. Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.
Greenlee Bros. & Co., 12th and Columbia Ave., Rockford, Ill.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.

(Continued on page 310)

(Continued on page 310)



FEATURES:

d, III. Ave.

is. N. Y. Co., 8, Pa. veland

s, Cinas St., Worstfield

k 101, , III. er St., Spring-N. Y. Im St., Philastfield II.

Ave.,

c 101, , III. ipring-

h and

nter

, III. h and

ndle

(101,

, III. er St.,

pring-

N. Y. Arbor, arango

Ave., s. 17, Mich. m St.,

. Co., 8, Pa. , Cin-

Ave.,

estead

- ★ Designed and made throughout for PRECISION.
- ★ Hardened and precision ground bed ways.
- ★ Sixty-six thread cutting and feed changes without gear change.
- ★ ALL spindle speeds are stepless, 25 to 2000 RPM, forward and reverse.
- ★ Choice of M. G. Variable Speed or new Hendey Electronic drive.
- ★ Spindle runs in preloaded, superprecision, anti-friction bearings, both ends.
- ★ Super-precision lead screw.
- ★ Safety features preventing simultaneous engagements of belt feed with gear feed, and lead screw with rack feed.
- ★ Separate feed rod (independent of lead screw).
- ★ Special clamping device for tailstock.

MODERN EMAEU

9"x24" TOOL AND GAGE-MAKERS' LATHE



FEATURING HARDENED & PRECISION GROUND BED WAYS

The Hendey 9" x 24" Tool and Gage-Makers' Lathe is a high-speed precision lathe — designed to satisfy the universal demand of expert tool and gage makers for a precision lathe of heavier design and greater adaptability. It has a swing over the ways of 10%" and over the cross slide of 5%". Maximum capacity of spring collets is 1%". A choice of the M. G. Variable Speed Drive or the new Hendey Electronic Drive is available. This tool and gage-makers' lathe will perform all operations within its scope most accurately and efficiently—it will save time and money, and eliminate spoilage of work chargeable to inaccuracy, insensitivity or incapacity of lathe equipment.

Hendey is especially qualified to manufacture such a lathe, because, for more than 70 years it has made lathes which have proved its claim of "Prestige with Production."

Write for free illustrative catalog on the Hendey 9" x 24" Lathe

the hendey machine company

another product from the plant of precision!

MAIN OFFICE & PLANT: TORRINGTON, CONN. BRANCH OFFICES: New York, Chicago, Boston, Detroit, Rochester, Los Angeles, San Francisco REPRESENTATIVES: Philadelphia, Cleveland, Pittsburgh CE

SERVI

CONTINUOUS

YEARS

LETS

AND

FORG

Z

GS

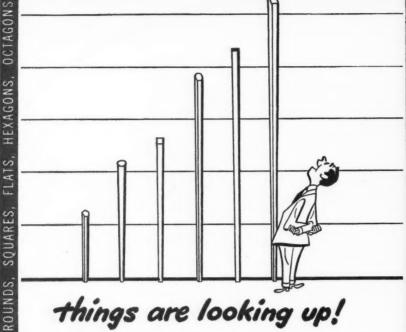
O R

PROD

TION

⋜

AND



things are looking up!

Yes, steel supplies are improving tonnage-wise! Even alloy steels are in better supply. However, the continued scarcity of many alloying materials makes certain grades of alloy steel still unobtainable, and substitute grades must be used.

Chances are, we can supply your needs . . . but if we can't, perhaps we can suggest and supply the substitutes best suited for your particular requirements.

Or possibly we can suggest alternative methods of manufacture, or variations in your present methods of treatment.

Your nearest W-L office will be delighted to be of service. Call them today!

Get in the SCRAP! ... every pound means more steel for you!

Write today for your FREE COPY of the Wheelock, Lovejoy Data Book, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

MPANY. INC

Warehouse Service

CAMBRIDGE • CLEVELAND CHICAGO • HILLSIDE, N. J. DETROIT • BUFFALO CINCINNATI

In Canada SANDERSON-NEWBOULD, LTD., MONTREAL

138 Sidney St., Cambridge 39, Mass.

and AISI

and Cleveland . Chicago . Detroit Hillside, N. J. . Bullalo . Cincinnati

Henry & Wright Div., Emhart Mfg. Co., 760 Windsor St., Hartford 1, Conn. Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill. Kingsbury Mch. Tool Corp., Keene, N. H. Leland-Gifford Co., 1025 Southbridge St., Wor-Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
Millholland, W. K., Mchry. Co., 6402 Westfield
Blvd., Indianapolis 5, Ind.
Moline Tool Co., 102 20th St., Moline, III,
National Automatic Tool Co., Inc., S. 7th and
N Sts., Richmond, Ind.
Pratt & Whitney, West Hartford 1, Conn.
Snow Mfg. Co., 435 Eastern Ave., Bellwood, III,
Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

DRILLING MACHINES, Radial

American Tool Works Co., Pearl and Eggleston Ave., Cincinnati, Ohio.
British Industries Corp., International Mchry. Div., 164 Duane St., New York, N. Y. Canedy-Otto Div., Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio.
Carlton Mch. Tool Co., 3000 Spring Grove Ave., Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y. Foote-Burt Co., 1300 St. Clair Ave., Cleveland Footie-Burt Co., 1300 St. Clair Ave., Cleveland 8, Ohio. Fosdick Mch. Tool Co., 1638 Blue Rock, Cin-cinnati 23, Ohio. Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, III,

DRILLING MACHINES, Rail

See Drilling Machines, Gang.

DRILLING MACHINES, Sensitive

Atlas Press Co., 1253 No. Pitcher St., Kalamazoo, Mich.
Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.
Canedy-Otto Div., Cincinnati Lathe & Tool Co.,
Oakley, Cincinnati, Ohio.
Cosa Corp., 405 Lexington Ave., New York 17,
N. Y. N. Y.
Delta Power Tool Div., Rockwell Mfg. Co.,
614G N. Lexington Ave., Pittsburgh 8, Pa.
Foote-Burt Co., 1300 St. Clair Ave., Cleveland
8, Ohio.
Fosdick Mch. Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.
Hamilton Tool Co., 834 South 9th St., Hamilton Tool Co., 834 South 9th St., Hamilton Tool Co., 834 South 9th St., Hamilton, Ohio.
Henry & Wright Div., Emhart Mfg. Co., 760
Windsor St., Hartford 1, Conn.
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.
Pratt & Whitney, West Hartford 1, Conn.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.
Snow Mfg. Co., 435 Eastern Ave., Bellwood, III.
Wales-Strippit Corp., North Tonawanda, N. Y.

DRILLING MACHINES, Upright

DRILLING MACHINES, Upright

Atlas Press Co., 1253 No. Pitcher St., Kalamazoo, Mich.

Baker Bros., Inc., Station F, P. O. Box 101,
Toledo 10, Ohio.

Barnes Drill Co., 814 Chestnut, Rockford, Ill.

Barnes, W. F. & John, Co., 201 S. Water St.,
Rockford, Ill.

Baush Mch. Tool Co., 156 Wason Ave., Springfield 7, Mass.

Buffalo Forge Co., 490 Broadway, Buffalo,
N. Y.

Canedy-Otto Div., Cincinnati Lathe & Tool Co.,
Qakley, Cincinnati, Ohio.

Cincinnati Bickford Tool Co., 3220 Forrer Ave.,
Cincinnati, Ohio. Cincinnati Bickford Tool Co., 3220 Forrer Ave., Cincinnati, Ohio.
Cleereman Mch. Tool Co., Green Bay, Wis. Consolidated Mch. Tool Corp., Rochester, N. Y. Cosa Corp., 405 Lexington Ave., New York 17, N. Y.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Foote-Burt Co., 1300 St. Clair Ave., Cleveland 8, Ohio

Foote-Burt Co., 1300 St. Clair Ave., Cleveland, 8, Ohio.
Fosdick Mch., Tool Co., 1638 Blue Rock, Cincinnati 23, Ohio.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, III.
Leland-Gifford Co., 1025 Southbridge St., Worcester Mass.

Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
Moline Tool Co., 102 20th St., Moline, Ill.
National Automatic Tool Co., Inc., S. 7th and
N Sts., Richmond, Ind.
Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.
Rehnberg-Jacobson Mfg. Co., 2135 Kishwaukee
St., Rockford, Ill.

(Continued on page 312)



o., 760 as St., Wor-

II. h and

Achry. ol Co., Ave., Ave.,

rk 17,

eland

, Cin-

er St.,

lama-

N. Y.

k 17,

Co., B, Pa. reland

Cin-

760 Wor-

h St.,

ama-101,

ring-

ffalo, Co.,

Ave.,

s. N. Y. k 17,

Co., Pa.

Cin-

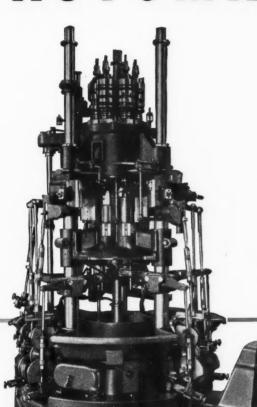
tead

St.,

worand

THE IMPROVED 6 SPINDLE PRECISION

AUTOMATIC LATHE



VERSATILE—SIX rotating end tools and SIX cross tool slides.

ECONOMICAL—Both in tooling and set-up expense; uses comparatively little floor space.

EFFICIENT—High production, with built-in precision to meet exacting standards.

UNIQUE DESIGN—Vertical arrangement reduces wear of moving parts. Gravity bar feed requires no feed fingers, reduces load on spindles, minimizes vibration and noise.

CHUCKING OPERATIONS

... can also be performed to great advantage. Vertical design permits easier loading and holding of work pieces.

GYROMATIC SIX-SPINDLE VERTICAL LATHE

(Shown without bar carrier and oil guards)

Typical work piece taken from bars; capacity to 2^5 % dia. and 6^{\parallel} long.





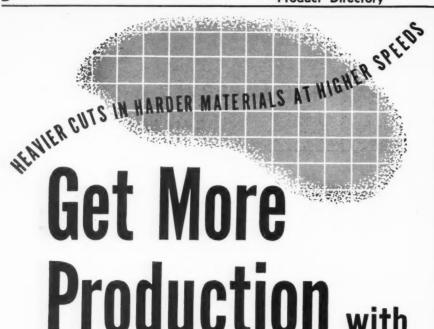
AMERICAN REPRESENTATIVES (UNITED STATES-EXCEPT WEST COAST)

RUSSELL, HOLBROOK & HENDERSON, INC.

(CALIFORNIA, OREGON, WASHINGTON)

ART THOMAS MACHINERY CO.

2820 LEONIS BLVD., LOS ANGELES, CALIF.



GORHAM "M-40-B" Tool Bits!

Get more out of your machine tools . . . raise your production curve... with Gorham "M-40-B" turning tools! Use "M-40-B" wherever the application of a Super High Speed Steel is indicated, as in machining heat treated alloy steels with large amounts of stock removal at high surface speeds.

"M-40-B" is a Super Moly grade with performance characteristics comparable to those of super tungsten high speed steel. It has extremely high red hardness, high Rockwell hardness, and offers maximum toughness and abrasion resistance. You can take heavy roughing cuts with it at high surface speeds and feeds . . . use it for high speed finish cuts as well.

"M-40-B" comes in square tool bits, 11 stock sizes, and in 23 stock sizes of rectangular turning tools. Bits and turning tools are accurately ground, uniformly hardened, ready to sharpen. Special sizes and shapes to your order. Illustrated with prices are three popular size "M-40-B" tool bits. See your distributor, or send direct for a trial order.

"M-40-B" is one of three cutting tool materials developed by Gorham. Others are Gorham "Standard", for the commercial field, and "Gormet", for turning soft or abrasive stock. They're completely described, with size and price lists, in a new free bulletin. Send for your copy today.



forham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

14405 WOODROW WILSON **DETROIT 3, MICHIGAN** WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne, Calif. Rogers Machine Works, Inc., Buffalo 10, N. Y. Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill. Snow Mfg. Co., 435 Eastern Ave., Bellwood, III. Wales-Strippit Corp., North Tonawanda, N. Y.

DRILLING MACHINES, Wall Radial

Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio. Consolidated Mch. Tool Corp., Rochester, N, Y,

DRILLS. Center

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. Gorham Tool Co., 14400 Woodrow Wilson, De-Cleveland, Onio.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Keo Cutters, 19326 Woodward, Detroit, Mich.
Morse Twist Drill & Mch. Co., New Bedford, Mass. Mass. National Twist Drill & Tool Co., Rochester, Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.

Union Twist Drill Co., Athol, Mass.

Warner & Swasey Co., 5701 Carnegie Ave.,

Cleveland 3, Ohio.

DRILLS, Core

Adamas Carbide Corp., 999 South 4th St., Harrison, N. J. Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. Erickson Tools Div. Erickson Steel Co., 2309 Hamilton, Cleveland, Ohio. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Firth Sterling Steel & Carbide Corp., McKeesport Pages port, Pa. Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Haynes Stellite Div., Union Carbide & Carbon
Corp., 30 E. 42nd St., New York, N. Y.
Morse Twist Drill & Mch. Co., New Bedford, Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Twist Drill & Tool Co., Rochester, Mich. uper Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Super Tool Co., 21650 noo...
Mich.
Union Twist Drill Co., Athol, Mass.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.
Willey's Carbide Tool Co., 1340 W. Vernor
Hwy., Detroit 1, Mich.

Pratt & Whitney, West Hartford 1, Conn. Union Twist Drill Co., Athol, Mass.

DRILLS. Portable Electric

Black & Decker Mfg. Co., Towson, Md.
Chicago Pneumatic Tool Co., 6 E. 44th St.,
New York, N. Y.
Mall Tool Co., 7740 S. Chicago Ave., Chicago,
Ill.
Millers Falls Co., Greenfield, Mass.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, N. Y.
Skilsaw, Inc., 5033 N. Elston, Chicago, Ill.

DRILLS, Portable Pneumatic

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Ingersoll-Rand Co., Phillipsburg, N. J. Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, III.

DRILLS, Ratchet

Armstrong Bros. Tool Co., 5200 W. Armstrong
Ave., Chicago, III.
Cleveland Twist Drill Co., 1242 E, 49th St.,
Cleveland, Ohio.
Greenfield Tap & Die Corp., Greenfield, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass. National Twist Drill & Tool Co., Rochester, Mich. Pratt & Whitney, West Hartford 1, Conn. Union Twist Drill Co., Athol, Mass.

DRILLS, Twist

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. Firth Sterling Steel & Carbide Corp., McKees-port, Pa.. Greenfield Tap & Die Corp., Greenfield, Mass. Morse Twist Drill & Mch. Co., New Bedford, Mass. National Twist Drill & Tool Co., Rochester, National Twist Communication Mich.

Prott & Whitney, West Hartford 1, Conn.

Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.

Super Tool Co., 21650 Hoover Rd., Detroit 13, Super Tool Co., 21650 Hoover Rd., Mich. Union Twist Drill Co., Athol, Mass. (Continued on page 314)

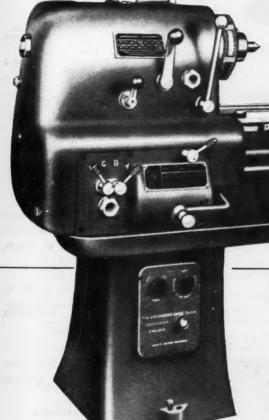
Outstanding British Machine Tools

Colchester

Geared Head Lathes



U.S. AGENCY FOR BRITISH MACHINE TOOLS



N. Y.

17 St. N. Y.

Mass. Mich.

nester, Cleve-Ave.,

n St., 237, h. 2309 Detroit Keesarbon dford, ester, it 13, Blvd.,

cago, h St.,

St.,

r St.,

rong St.,

hass. ford,

ster,

St.,

ster,

Small tool room lathes and larger engine lathes also available.

Factory trained service, and spare parts stocks from New York.

U. S. Industry by one of England's greatest builders of fine machine tools.

Precision engineered for

Colchester Lathes

Dealerships in certain territories

The Colchester Dominion line is respected throughout the world for outstanding performance and rugged wear. Built to tool room tolerances and designed specifically for the American market, the Dominion "13", "15" and "17" are prime examples of the best machine tools produced in Great Britain.

Mcdel No.	Colchester Dominion 17	Colchester Dominion 15	Colchester Dominion 13	
Swing Over Bed	17"	15"	13"	_
Distance Between Centers	6'6"	4'	3'2"	
Swing Over Saddle	12"	91/2"	9"	
Dia. of Face Plate	16"	14"	12"	
Spindle Bore	3-1/16"	2-1/16"	1-9/16"	
Max. Collet Capacity	2" Dia.	2" Dia.	l" Dia.	
8 Spindle Speeds	25 to 410 RPM	30 to 600 RPM	42 to 800 RPM	
Range-Threads per inch	4-56	4-56	4-56	
Drive	5 H.P.	3 H. P.	11/2H. P.	
Net Weight-lbs.	3500	1790	1176	

DELIVERY: 30 Days or Less



MAIL THIS COUPON

for complimentary book, "British Machine Tools"

Valuable 48 page catalogue describing and illustrating hundreds of outstanding machine tools.

BRITISH	I	N	D	Į	JS	5	r!	R	I	E	35	5	1	C	(R	I			E) e	ı	t	N	4	-	8											
164 Duane Gentlemen																										_	_		T	-	_	1.	.,,	9		4.			
Gentlemen	٠	X	1	e	as	se		8	e	n	a				31	E1	J	12	SE	1	Ä	M	18	ıc	13	n	e		1	0	0	8.3	8		1	и	>		
Name		۰				0		0	0		۰		•					۰												0							۰		
Company.						*	*																													4			
Position																									 														

Street

BRITISH INDUSTRIES CORP.

164 DUANE STREET, NEW YORK 13, N. Y.

FEW OF THE Many Operations DO WITH THIS MACHINE

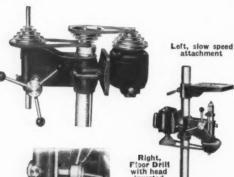
Palo No. 15 DRILL

Drilling, tapping, reaming, back spot-facing, mortising, multiple production drilling . . . are just a few of the operations you can do with these highly adaptable machines! "Buffalo" No. 15 Drills are available in a dozen different models in one to six spindles for floor or bench-plus mortising, slow speed and tapping attachment - plus many other special attachments you may desire. Here's a precision-fitted, easy-to-operate machine that can be adapted to fit an almost unlimited number of operations for the greatest speed and

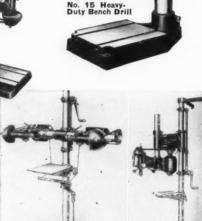


No. 15-M Manufacturing Type Bench Drill-1 to 6 Spindles









YOUR COPY! **New Bulletin** 2963-G shows the flexibility of

WRITE TODAY for your copy.

the No. 15 Drill.



440 BROADWAY

COMPANY

MACHINE TOOLS

BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING

PUNCHING

SHEARING CUTTING

BENDING

DRILLS, Wire

Greenfield Tap & Die Corp., Greenfield, Mass. Morse Twist Drill & Mch. Co., New Bedford, Mass. National Twist Drill & Tool Co., Rochester, Mich.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Union Twist Drill Co., Athol, Mass.

DUPLICATORS

Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis. Pratt & Whitney, West Hartford 1, Conn. Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford III. Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, III. Turchan Follower Mch. Co., 8259 Livernois, Detroit, Mich.

DUST COLLECTORS

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Pangborn Corp., Hagerstown, Md. Torit Mfg. Co., 307 Walnut St., St. Paul 2, Minn.

DUST CONTROL SYSTEMS

American Air Filter Co., Inc., Louisville, Ky. Leiman Bros., Inc., 156 Christie St., Newark, N. J. Pangborn Corp., Hagerstown, Md. Torit Mfg. Co., 307 Walnut St., St. Paul 2, Minn.

ELECTRICAL EQUIPMENT

General Electric Co., Schenectady 5, N. Y.

EMERY WHEEL DRESSERS

See Dressers, Grinding Wheel.

EMERY WHEELS

See Grinding Wheels.

ENGRAVING MACHINES

British Industries Corp., International Mchry. Div., 164 Duane St., New York. Cosa Corp., 405 Lexington Ave., New York 17, N. Y. Gorton, George, Mch. Co., 1110 W. 13th St., kacine, Wis.

EXTRACTORS, Screw

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. Greenfield Tap & Die Corp., Greenfield, Mass. Morse Twist Drill & Mch. Co., New Bedford, Mass. Union Twist Drill Co., Athol, Mass.

FACING MACHINES

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.

FANS, Exhaust, Electric Ventilating

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y. General Electric Co., Schenectady 5, N. Y.

FEEDS FOR PRESSES, Automatic

Federal Press Co., 600 Division and Big Four R. R., Elkhart, Ind. Federal Press Co., 600 Division and Big Four R. R., Elkhart, Ind. Nilson, A. H., Mch. Co., 1506 Railroad Ave., Bridgeport, Conn. U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J. V & O Press Co., Div. Emhart Mfg. Co., Hudson, N. Y.

FELT, For All Applications

American Felt Co., Glenville, Conn.

FILES, Hack

DoAll Co., 254 Laurel Ave., Des Plaines, III. Simonds Saw & Steel Co., 470 Main St., Fitch-burg, Mass.

FILES, Hand

DoAll Co., 254 Laurel Ave., Des Plaines, III. Heller Bros. Co., Newcomerstown, Ohio. Nicholson File Co., 23 Acorn St., Providence, Severance Tool Industries, Inc., 636 Iowa Ave., Saginaw, Mich. Simonds Saw & Steel Co., 470 Main St., Fitch-burg, Mass.

(Continued on page 316)

A G. S. CUSTOMER' WRITES: ".. how pleased we have always been with all our dealings with Gear Specialties."
NAME ON REQUEST

FRACTIONAL HOSSING.

Get Smoother, Quieter, Longer-Lived Fractional Horsepower Gearing!

Most of the Small Gearing we make goes to customers we've served for years! Sure, we keep adding new accounts, but before long they, too, join the list of old-timers. Steady repeat business is a sure sign of satisfied customers. Our Gears just have to be better.. they must run longer, and smoother, and quieter, to win such lasting loyalty. *During the past thirty-six years, we've never swerved from the single purpose of making Fractional Horsepower Gearing exclusively! And we've never relaxed in our efforts to mass-produce them quicker, more efficiently and econom-

ically. This devotion to consistently doing ONE job superlatively well has helped us gain the enviable position of "WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSE-POWER GEARING"! * Chances are G. S. Small Gearing would improve your product too! Our experienced engineers will gladly help you design or determine the best and most economical Small Gearing for your needs. Call us in at the drawing board stage. Suggestions, ideas, and cost estimates incur no obligation. Write or phone us TODAY!

SEND FOR.

ster, eve-

St.,

1 2,

1 2,

17, St.,

St.,

roit

and

alo,

St.,

the G.S. 6-page illustrated folder. It describes and illustrates G.S. facilities, Small Gearing and applications, together with handy charts. Will you ask for it on company stationery, please? No obligation, of course.

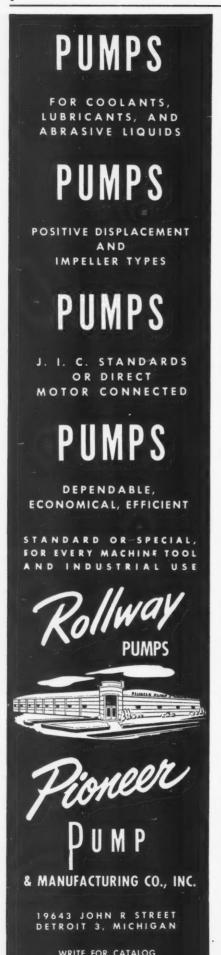




FAR Specialties Inc

Spurs · Spirals · Helicals · Bevels · Internals · Worm Gearing · Racks · Thread Grinding 2635 WEST MEDILL AVENUE · CHICAGO 47, ILLINOIS

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRÂCTIONAL HORSEPOWER GEARS



FILES, Machine

DoAll Co., 254 Laurel Ave., Des Plaines, III.
Oliver Instrument Co., 1410 E. Maumee St.,
Adrian, Mich.

FILES AND BURS, Rotary

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Jarvis, Chas. L., Co., Middletown, Conn.
Pratt & Whitney, West Hartford 1, Conn.
Severance Tool Industries, Inc., 636 Iowa Ave.,
Saginaw, Mich.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.

FILING MACHINES, Dies, Etc.

DoAll Co., 254 Laurel Ave., Des Plaines, III. Grob Bros., Grafton, Wis. Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y. Jarvis, Chas. L., Co., Middletown, Conn. Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.

FILTERS, Air

American Air Filter Co., Inc., Louisville, Ky.

FILTERS, Coolant and Oil

Bowser, Inc., 1365 E. Creighton Ave., Fort Wayne, Ind. Cuno Engrg. Corp., Meriden, Conn. Honan-Crane Corp., Lebanon, Ind.

FINISHES FOR MACHINES AND METAL PARTS

Lowe Bros. Co., Dayton, Ohio.

FLEXIBLE COUPLINGS

See Couplings, Flexible.

FLEXIBLE SHAFT EQUIPMENT

Jarvis, Chas. L., Co., Middletown, Conn.
Mall Tool Co., 7740 S. Chicago Ave., Chicago,
Ill.
Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Walker-Turner Div., Kearney & Trecker Corp.,
South Ave., Plainfield, N. J.

FORGING (Upsetting) MACHINES

Ajax Mfg. Co., Euclid, Cleveland 17, Ohio. Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio. National Machinery Co., Greenfield and Stanton Sts., Tiffin, Ohio.

FORGINGS, Drop

Bethlehem Steel Co., Bethlehem, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd.,
Chicago 50, III.
Williams, J. H., & Co., 400 Vulcan St., Buffalo
7, N. Y.

FORGINGS, Hollow Bored

Bethlehem Steel Co., Bethlehem, Pa. National Forge & Ordnance Co., Irvine, Warren Co., Pa.

FORGINGS, Iron and Steel

Bethlehem Steel Co., Bethlehem, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd.,
Chicago 50, III.
Morgan Engrg. Co., Alliance, Ohio.
National Forge & Ordnance Co., Irvine, Warren
County, Pa.

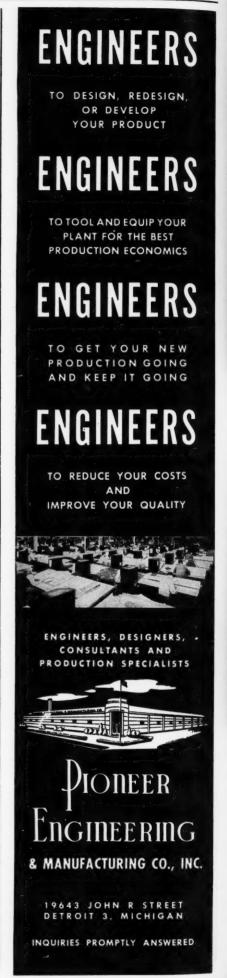
FORGINGS, Upset

Bethlehem Steel Co., Bethlehem, Pa.
Kropp Forge Co., 5301 W. Roosevelt Rd.,
Chicago 50, III.
Williams, J. H., & Co., 400 Vulcan St., Buffalo
7, N. Y.

FORMING AND BENDING MACHINES

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio. Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio. Bethlehem Steel Co., Bethlehem, Pa.

(Continued on page 320)



DUF demon on a 105.

mm Barr

aircı

engi

Mac

105

SENE



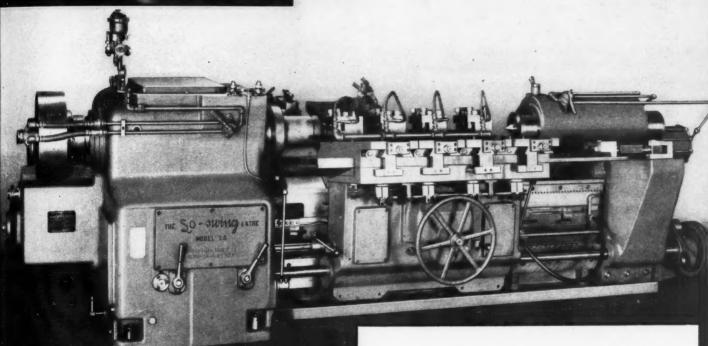
PROVED ON ORDNANCE WORK



Lo-swing IMP, proved on 40 mm shells and small Ordnance Parts.

Model LS Lo-swing proved on 105 mm Gun Barrels, and 220 and 240 mm Shells.





DURING WORLD WAR II, Lo-swing Lathes demonstrated their productiveness and stamina on a wide range of Ordnance Work...40, 75, 90, 105, 155, 220 and 240 mm Shells—50 and 81 mm Trench Bombs—20, 40 and 105 mm Gun Barrels—camshafts, cylinder sleeves, radial aircraft cylinders, landing struts, large diesel engine cylinders, etc. The Model CS Centering Machine was used extensively on 75, 90 and 105 mm Shells.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

- ▶ Lo-swing IMP Lathe. Fully automatic, for small diameter work at high speeds.
- ▶ Model LR *Lo-swing* Lathe. Fully automatic, for medium sized work.
- ▶ Model AR *Lo-swing* Lathe. Fully automatic, for medium and large size work.
- ▶ Model R-14 Lo-swing Lathe. Fully automatic, for large size work.
- ▶ Model AP *Lo-swing* Lathe. Semi-automatic, for work requiring long carriage travel.
- ▶ Model LS *Lo-swing* Lathe. Semi-automatic for turning long gun barrels and heavy shells up to 13" in diameter.
- ► Model CS Drilling and Centering Machine. Fully automatic for all centering operations.

So-swing AUTOMATIC LATHES

Are you getting maximum returns from your carbide-tool investment?

You are if your cemented carbide tools pay off with top production at top tool speeds . . .

if top tool life is combined with top adherence to tolerances . . .

if top production per tool is coupled with minimum rejects . . .

and if your investment in carbide tools is limited to universal-use standards, permitting a low inventory of special multiple-point tools.

In short, you are getting maximum returns if you use Carboloy Cemented Carbide tools, for Carboloy quality and service are designed to deliver all carbide benefits, to give you maximum returns from each dollar invested in cemented carbide tools.

Scan the Carboloy products briefly described on these pages. Then shoot the coupon at the right back to us for your free copy of the complete Carboloy General Tool Catalog.

And for your immediate carbide-tool needs, why not telephone your Carboloy Distributor right away?

Stocks now at your Carboloy Distributor's—ready for immediate delivery—will satisfy your every need in Standard Carboloy Tools and Blanks, and most special tools equipped with Carboloy Cemented Carbides. Call your local Carboloy Distributor now.

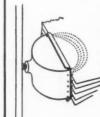
"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company

CARBOLOY

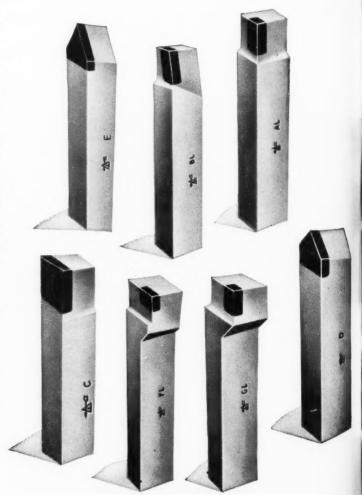
DEPARTMENT OF GENERAL ELECTRIC COMPANY 11147 E. 8 Mile Street, Detroit 32, Michigan

PLANTS AT
DETROIT, MICHIGAN; EDMORE, MICHIGAN;
AND SCHENECTADY, NEW YORK



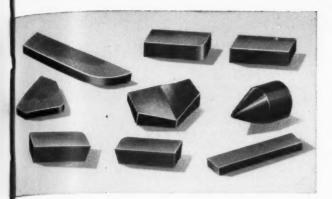


Carboloy Permanent-Magnet Sheet-Steel Separators prevent feeding of doubles. Use permanent magnets to give an extra "hand" in your shop work. Great for magnetic stands, tool-holding devices, sweepers' "pick-up" tools, magnetic paper grippers on machines, containers for small parts, and magnetic retrievers. Write for FREE Carboloy Permanent Magnet Stock Catalog, PM-100. (Use handy coupon at right.)



11 STANDARD CARBOLOY TOOLS Perform 80% of Your Machining!

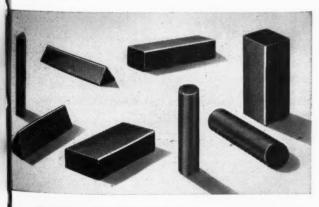
Chop your costly special carbide-tool inventories with Standard Carboloy Tools. Only 11 styles (right-hand tools not illustrated) do up to 80% of all your single-point tool machining. Whatever the job, odds are versatile Standard Carboloy Tools will do it. What's more, they'll outproduce and outlast high-speed steel tools by as much as 10 to 1! At the same time, they'll pile up savings in machine-tool maintenance, down-time and replacement. You can count on Standard Carboloy Tools, whether used "as is" or quickly and economically specially ground in your own toolroom, to do a wide variety of jobs faster, better, for less. (See pages 14-19, 20-27 in your Carboloy General Tool Catalog, GT-250.)



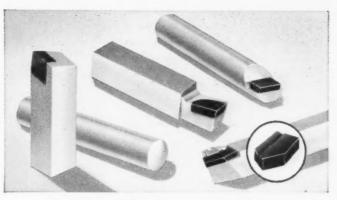
STANDARD CARBOLOY BLANKS are mass-produced, available in many styles and hundreds of sizes at extremely low prices. They are designed for broad use in most of your machining needs. Brazing Carboloy Blanks to tool shanks will handle your emergency jobs readily; no time lost on special tooling. (See pages 20–22, 32–42 of your Carboloy General Tool Catalog, GT-250.)



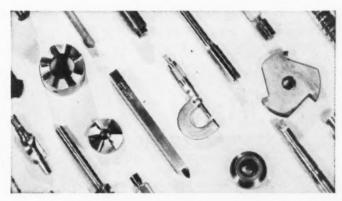
SPECIAL CARBOLOY BLANKS can be furnished in any size, shape and grade of cemented carbide to meet your exact, individual requirements. In addition to general types of special shapes, flatformed blanks with complicated shapes and a large selection of semistandard and modified blanks can be made, ground or unground. (See pages 43-44 of your Carboloy General Tool Catalog, GT-250.)



CARBOLOY INSERT BLANKS are available in stock in round, triangular, square and rectangular styles in a wide variety of sizes; they are finish-ground, ready for use in your mechanical-type holders. Inserts are quickly resharpened by off-hand grinding and have several cutting edges, depending upon shape of insert. For example, ½" square insert has eight cutting edges, four on either side. (See pages 20-22 of your Carboloy General Tool Catalog, GT-250.)



OTHER CARBOLOY STANDARD TOOLS in a wide selection that includes: roller turner tools, blanks for clamped-on-type tools, boring tools, and solid Carboloy cylinders that can be adapted to many special shapes in solid boring tools. All items are in stock; semi-finish, or finish-ground, ready for use. Tools that will save plenty in production. (See pages 22-28 of your Carboloy General Tool Catalog.)



SPECIAL TOOLS EQUIPPED WITH CARBOLOY CEMENTED CARBIDE. Carboloy Cemented Carbide is furnished to more than 250 leading tool manufacturers for use in special tools, many of which are stocked by Carboloy Distributors. Also, when requested, Carboloy engineers work with the tool maker to help his customer (you) solve special problems. (See pages 28-29 of Catalog, GT-250.)



Complete Carboloy FREE!

It's a fact-packed 60 pages. Hundreds of illustrations showing typical uses, specifications. Also, conversion tables for cutting steels, ferrous, nonferrous and nonmetallic materials. Lists other free Carboloy Services, technical literature. Send coupon below today!

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY 11147 E. 8 Mile Street, Detroit 32, Michigan

et, Detroit 32, Michigan

Date_____

Please send me, without cost or obligation:

□ Carboloy General Tool Catalog, GT-250
 □ Carboloy Permanent Magnet Catalog, PM-100

Name Position

Company

Address

State

Chambersburg Engrg. Co., Chambersburg, Pa.
Cincinnati Shaper Co., Elam and Garrard Ave.,
Cincinnati, Ohio.
Cleveland Punch & Shear Works Co., 3917 St.
Clair Ave., N. E., Cleveland, Ohio.
Columbia Machinery & Engineering Corp.,
Hamilton 1, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Dreis & Krump Mfg. Co., 7416 Loomis Blvd.,
Chicago 36, Ill.
Ferracute Machine Co., Bridgeton, N. J.
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,
Ill.

III.
Hufford Machine Works, Inc., 1700 E. Grand
Ave., El Segundo, Calif. (Stretch-Wrap).
Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
Mt. Gilead, Ohio.
Niagara Mch. & Tool Works, 683 Northland
Ave., Buffalo, N. Y.
O'Neill-Irwin Mfg. Co., Lake City, Minn.
Yoder Co., 5500 Walworth, Cleveland, Ohio.

FORMING AND STAMPING MACHINES

Chambersburg Engrg. Co., Chambersburg, Pa. Cincinnati Shaper Co., Elam and Garrard Ave., Cincinnati, Ohio.

Dreis & Krump Mfg. Co., 7416 Loomis Blvd., Chicago 36, III. Henry & Wright Div., Emhart Mfg. Co., 760 Windsor St., Hartford 1, Conn. Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio. Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

N. Y.
Niagara Mch. & Tool Works, 683 Northland
Ave., Buffalo, N. Y.
Nilson, A. H., Mch. Co., 1506 Railroad Ave.,
Bridgeport, Conn.
U. S. Tool Co., Inc., 255 North 18th St.,
Ampere, N. J.
V & O Press Co., Div. Emhart Mfg. Co., Hudson,
N. Y.

FORMING TOOLS or Tool Blanks

Adamas Carbide Corp., 999 South 4th St., Harrison, N. J. Adams Carbide Corp., 999 South 4th St., Harrison, N. J. Brown & Sharpe Mfg. Co., Providence, R. I. Firth Sterling Steel & Carbide Corp., McKees-port, Pa. Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.

Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York Kennametal, Inc., Latrobe, Pa. National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich. Pratt & Whitney, West Hartford 1, Conn, Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

FRAMES, Machinery Welded

Mahon, R. H., Co., Detroit 34, Mich.

FURNACES, Heat-Treating

General Electric Co., Schenectady 5, N. Y.

FURNITURE, Shop

Standard Pressed Steel Co., Jenkintown, Pa.

GAGE BLOCKS

Brown & Sharpe Mfg. Co., Providence, R. I.
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.
Pratt & Whitney, West Hartford 1, Conn.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Van Keuren Co., 176 Waltham St., Watertown,
Boston, Mass.
Webber Gage Co., 12909 Triskett Rd., Cleveland 11, Ohio.

GAGES, Air

DoAll Co., 254 Laurel Ave., Des Plaines, Ill. Federal Products Corp., P. O. Box 1027, Provi-dence, R. I. Pratt & Whitney, West Hartford 1, Conn. Sheffield Corp., 721 Springfield, Dayton, Ohio.

GAGES, Comparator

Ames, B. C., Co., Waltham 54, Mass. Comtor Co., 47 Farwell St., Waltham 54, Mass. DoAII Co., 254 Laurel Ave., Des Plaines, III. Federal Products Corp., P. O. Box 1027, Providence, R. I. Jones & Lamson Mch. Co., 160 Clinton St., Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt. Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y. Pratt & Whitney, West Hartford 1, Conn. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y. Sheffield Corp., 721 Springfield, Dayton, Ohio. Standard Gage Co., Inc., Poughkeepsie, N. Y. Surface Checking Gage Co., 5864 Hollywood Blvd., Hollywood 28, Calif. Taft-Peirce Mfg. Co., Woonsocket, R. I.

GAGES, Depth

Ames, B. C., Co. (Dial) Waltham 54, Mass. Brown & Sharpe Mfg. Co., Providence, R. I. DoAll Co., 254 Laurel Ave., Des Plaines, Ill. Federal Products Corp., P. O. Box 1027, Providence, R. I. Millers Falls Co., Greenfield, Mass. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y. Sheffield Corp., 721 Springfield, Dayton, Ohio. Standard Gage Co., Inc., Poughkeepsie, N. Y. Starrett, The L. S., Co., Athol, Mass.

GAGES. Dial

GAGES, Dial

Ames, B. C., Co., Waltham 54, Mass.
Bristol Co., Platts Mills, Waterbury, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
DoAll Co., 254 Laurel Ave., Des Plaines, III.
Federal Products Corp., P. O. Box 1027, Providence, R. I.
Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Starrett, The L. S., Co., Athol, Mass.

GAGES. Electric

DoAll Co., 254 Laurel Ave., Des Plaines, III.
Federal Products Corp., P. O. Box 1027, Providence, R. I.
Pratt & Whitney, West Hartford 1, Conn.
Sheffield Corp., 721 Springfield, Dayton, Ohio.

GAGES, Height

GAGES, Height

Ames, B. C., Co., Waltham 54, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.

DoAll Co., 254 Laurel Ave., Des Plaines, III.

Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.

Pratt & Whitney, West Hartford 1, Conn.

Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.

Sheffield Corp., 721 Springfield, Dayton, Ohio.

Starrett, The L. S., Co., Athol, Mass.

(Continued on base 322) (Continued on page 322)



THE automobile industry created and grew with "planned production efficiency". From a large automobile manufacturer, a leader in production efficiency, comes the story showing the reason for an industry-wide switch to ERICKSON precision holding tools.

"... Since installing ERICKSON collet chucks on all machines last year, we have reduced a breakage of 20 drills per day (as high as 40 when forgings were hard) to less than 3 or 4 broken drills a day. The full grip of ERICKSON collet chucks stops drill chatter and whip. Also, they permit the use of longer drills and drill stubbing giving greatly added drill life. The above figures are based on an average of 1200 crankshafts a day.

ONLY ERICKSON PRECISION CHUCKS...

- 1. Deliver guaranteed accuracy of .0005" T.I.R.
- 2. Grip along entire length of collet.
- 3. Replace 7 standard singlepurpose collets.
- 4. Grip on drill flutes; permit stubbing and use of broken drills.
- 5. Permit use of greater feeds and speeds.
- 6. Prolong tool life.
- 7. Reduce set up time.

Write for Catalog "J" today

DIVISION OF THE ERICKSON STEEL COMPANY 2319F HAMILTON AVE. . CLEVELAND 14, OHIO



You Can Clean <u>This</u> Fluid Strainer <u>Without</u> Stopping the Flow

Cuno AUTO-KLEAN is the *only* fluid strainer with "combaction cleaning" which permits it to work uninterruptedly. Dirt accumulations are dislodged while the straining goes on. This can be done automatically. Guaranteed to remove 100% of all solids larger than specified.



Jean

Blvd.,

leve-

l. rovi-

Ohio.

Ave.,

St.

l. rovi-

I. I. rovi-

Ave.,

St.,

Ohio.

l. rovi-

Ohio.

I. Ave.,

St.,

hio.

Removes More Sizes of Solids from More Kinds of Fluids

Strain fuels, lubricants, process fluids, etc.—AUTO-KLEAN Filter fuels, lubricants, process fluids, etc.—MICRO-KLEAN Clean raw water, recirculating water, etc.—FLO-KLEAN

Fluid Conditioning

A Lot of Dependability in a Small Package

Thousands of industrial firms recognize the Cuno AUTO-KLEAN disc-type strainer as an indication of *protection* on lube and hydraulic systems.

They know the machine builder has provided the best means of keeping fluids *clean* . . . when he has installed the AUTO-KLEAN as standard equipment.

They appreciate, too, the ease with which the AUTO-KLEAN works. A turn of a handle—periodically by hand or continuously by automatic means—is all that is necessary to keep the strainer itself clean. This is done without stopping flow. And there's nothing to replace or renew.

They also know that the AUTO-KLEAN is *guaranteed* to remove 100% of the solids larger than specified*... with minimum pressure drop.

The Favorite of Designers

The Cuno AUTO-KLEAN solves other problems right on the board.

It's compact. A single unit handling full flow (from a few to more than 4000 gpm) occupies no more space than the usual partial-flow type.

You can build it in—or mount it externally. Inlet and outlet can be in any position. You can install it on low pressure or gravity feed or suction with no loss of efficiency.

And you can depend upon it lasting as long as the equipment on which it is installed because it is all-metal and non-collapsible and can be made of a wide range of materials for various fluids, viscosities, temperatures and solids to be handled.

*Available spacings from .0035 in. to .062 in.

Cuno Dept.																			e	ri	d	e	n	0	(ċ	10	11	1
Pleas	e :	ser	nd	i	n	fo	r	m	C	t	io	n	1 1	D	n	(Cu	31	10)	A	U	T	0	-1	(l	E	A	h
for .																													
Name	е.																												•
Comp	oai	ny											0																
Addr	es:	s														•													
City.		Ple												Z	0	n	e					S	to	ıŧ	e				

GAGES, Plug, Ring and Snap

GAGES, Plug, Ring and Snap

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 5B, Calif. Brown & Sharpe Mfg. Co., Providence, R. I. Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. DoAll Co., 254 Laurel Ave., Des Plaines, Ill. Federal Products Corp., P. O. Box 1027, Providence, R. I.

Firth Sterling Steel & Carbide Corp., McKeesport, Pa.

Greenfield Tap & Die Corp., Greenfield, Mass. Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York. Kennametal, Inc., Latrobe, Pa.

Metal Carbides Corp., Youngstown, Pa.

Metal Carbides Corp., Youngstown, Pa.

Morse Twist Drill & Mch. Co., New Bedford, Mass.

Metal Carbides Corp., Youngstown, Pa.
Morse Twist Drill & Mch. Co., New Bedford,
Mass.
Pratt & Whitney, West Hartford 1, Conn.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Starrett, The L. S., Co., Athol, Mass.
Van Keuren Co., 176 Waltham St., Watertown,
Boston, Mass.

Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich. Willey's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich. Woodworth, N. A., Co., 1300 E. Nine Mile Rd., Detroit 20, Mich.

GAGES, Surface

GAGES, Surface

Ames, B. C., Co., Waltham 54, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Columbus Die, Tool & Mch. Co., 955 Cleveland
Ave., Columbus, Ohio.
DoAll Co., 254 Laurel Ave., Des Plaines, III.
Millers Falls Co., Greenfield, Mass.
Sheffield Corp., 721 Springfield, Dayton, Ohlo.
Starrett, The L. S., Co., Athol, Mass.
Surface Checking Gage Co., 5864 Hollywood
Blvd., Hollywood 28, Calif.

GAGES, Taper

Brown & Sharpe Mfg. Co., Providence, R. I. DoAll Co., 254 Laurel Ave., Des Plaines, III. Engis Equipment Co., 431 S. Dearborn St., Chicago 5, III.

Pratt & Whitney, West Hartford 1, Conn. Sheffield Corp., 721 Springfield, Dayton, Ohio. Starrett, The L. S., Co., Athol, Mass. Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

GAGES, Thread

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif.
Bath, John, Co., Inc., Worcester, Mass.
Detroit Tap & Tool Co., Detroit, Mich.
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.
Federal Products Corp., P. O. Box 1027, Providence Federal Products Corp., P. O. Box 1027, Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass,
Prott & Whitney, West Hartford 1, Conn.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Vinco Corp., 8855 Schaefer Highway, Detroit
27, Mich.
Woodworth, N. A., Co., 1300 E. Nine Mile Rd.,
Detroit 20, Mich.

Garlock Packing Co., Palmyra, N. Y.

GEAR BLANKS, Non-Metallic

Braun Gear Co., 239 Richmond, Brooklyn 8, N. Y. General Electric Co., Schenectady 5, N. Y.

GEAR BURN!SHING MACHINES

Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. Sheffield Corp., 721 Springfield, Dayton, Ohio.

GEAR CHAMFERING, ROUNDING AND BURRING MACHINES

Bilgram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa. Consolidated Mch. Tool Corp., Rochester, N. Y. Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. Lipe-Rollway Corp., 806 Emerson Ave., Syra-cuse, N. Y. Sheffield Corp., 721 Springfield, Dayton, Ohio.

Mea Ma by f forn 0 Two

diffe

auto

GEAR CHECKING INSTRUMENTS AND EQUIPMENT

Brown & Sharpe Mfg. Co., Providence, R. I. Eastman Kodak Co., Rochester, N. Y. Fellows Gear Shaper Co., 78 River St., Springfield, Vt. Gleason Works, 1000 University Ave., Rochester 3, N. Y. Michigan Tool Co., 7173 E. McNichols Rd., Detroit 12, Mich. National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y. Starrett, The L. S., Co., Athol, Mass. Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

GEAR CUTTING MACHINES, Bevel Geors (Generators)

Bilaram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa. Gleason Works, 1000 University Ave., Rochester 3, N. Y.

GEAR CUTTING MACHINES, **Bevel Gears, Spiral**

Gleason Works, 1000 University Ave., Rochester 3, N. Y.

GEAR CUTTING MACHINES, Spur and **Bevel Gears (Rotary Cutter)**

Waltham Machine Works, Newton St., Waltham, Mass.

GEAR CUTTING MACHINES, Spur and Helical Gears (Hobbing)

Barber-Colman Co., Rock and Montague, Rockford, III.

Hamilton Tool Co., 834 South 9th St., Hamilton, Ohio.

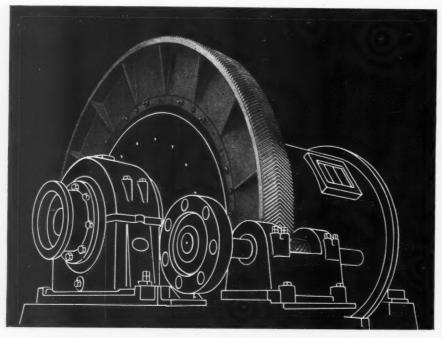
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.

Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.

Triplex Machine Tool Corp., 125 Barclay St., New York, N. Y.

(Continued on page 324)



WHERE THE GOING IS TOUGH Specify Farrel® Gears

Precision generation combined with the use of highest grade materials gives Farrel herringbone gears the ability to withstand the heaviest shock loads encountered in machine applications.

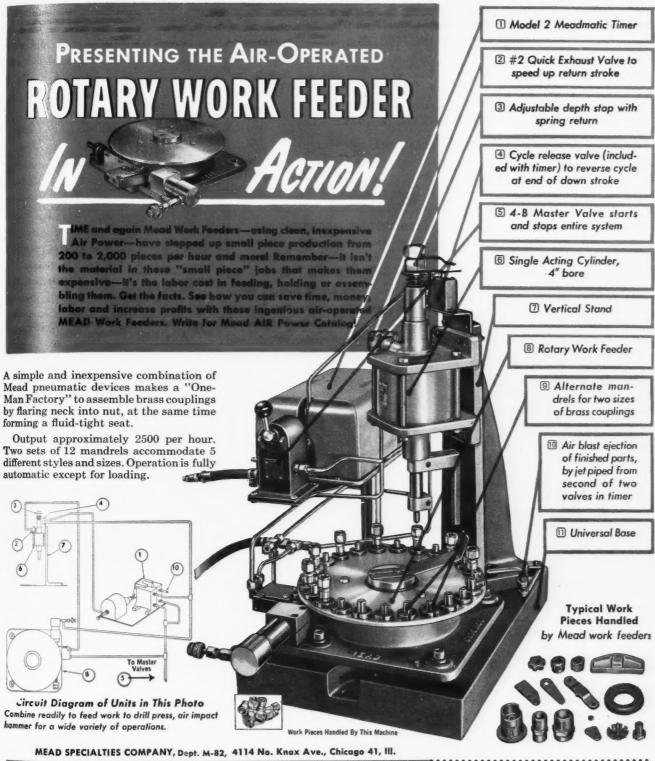
Accuracy of tooth contour and tooth spacing, overlap or interlacing of the teeth, gradual engagement and inclined line of pressure contribute to smooth operation and maintenance of correct tooth action throughout a long gear life. The opposed helices balance and absorb

axial thrust within the gear member, preventing harmful thrust loads with resultant stresses on other parts of the machinery.

Farrel herringbone gears are made in a complete range of sizes, from 1/4 inch to 20 feet diameter, for any power capacity and any application. Company engineers will be glad to assist you in working out unusual gear problems. Information will be sent on request.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y. Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Detroit, Chicago, Minneapolis, Portland (Oregon), Los Angeles, Salt Lake City, Tulsa, Houston, New Orleans





ovi-

\$5. hio.

roit

Rd.,

ND

ing

ng-

td.,

St., oit

ter

ter

al-

ck nil-าก-

d., านใ št.,

Memo Coupon

MEAD SPECIALTIES CO.

4114 N. Knox Ave., DEPT. M-82, Chicago 41, III. Send free copy of new, colored MEAD INDUS-

complete line of fa	amous Mead air	operated device
Name		
Company		
Address		
City	Zone	State

GEAR CUTTING MACHINES, Spur and Helical Gears (Shaper or Planer Type)

Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn. Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. field, Vt.
Kelvin Systems Corp., 135 Front St., New York
5, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd.,
Detroit 12, Mich.
National Tool Co., 11200 Madison Ave., Cleveland, Ohio.

GEAR CUTTING MACHINES, Worm and Worm Wheels

Barber-Colman Co., Rock and Montague, Rockford, III.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt. (Straight and Hourglass Types). Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.

GEAR FINISHING MACHINES

Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

GEAR GRINDING MACHINES

Cosa Corp., 405 Lexington Ave., New York 17, N. Y. N. Y.
Gleason Works, 1000 University Ave., Rochester 3, N. Y.
National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.
National Tool Co., 11200 Madison Ave., Cleveland, Ohio.
Pratt & Whitney, West Hartford 1, Conn.
Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

GEAR HARDENING MACHINES

Gleason Works, 1000 University Ave., Rochester 3, N. Y.

GEAR LAPPING MACHINES

Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. field, Vt.
Gleason Works, 1000 University Ave., Rochester
3, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd.,
Detroit 12, Mich.
National Broach & Mch. Co., 5600 St. Jean
Ave., Detroit 2, Mich.

GEAR MOTORS

See Speed Reducers,

GEAR SHAVING MACHINES

Fellows Gear Shaper Co., 78 River St., Spring-field, Vt. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. National Broach & Mch. Co., 5600 St. Jean Ave., Detroit 2, Mich.

GEAR TESTING MACHINERY

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Eastman Kodak Co., Rochester, N. Y.
Farrel-Birmingham Co., Inc., 25 Main St.,
Ansonia, Conn.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Gleason Works, 1000 University Ave., Rochester 3, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd.,
Detroit 12, Mich.
National Broach & Mch. Co., 5600 St. Jean
Ave., Detroit 2, Mich.
National Tool Co., 11200 Madison Ave.,
Cleveland, Ohio.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y. Baldwin-Lima-Hamilton Corp., Philadelphia

GEARS, Cut

American Stock Gear Div., Perfection Gear Co., Harvey, III.
Atlantic Gear Works, Inc., 200 Lafayette St., New York 12, N. Y.
Automotive Gear Works, Inc., Richmond, Ind.
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.

Bilgram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa. Boston Gear Works, Inc., North Quincy 71, Mass.
Brad Foote Gear Works, 1309 S. Cicero Ave.,
Cicero 50, III.
Braun Gear Co., 239 Richmond, Brooklyn 8,
N. Y.
Cincinnati Gear Co., Wooster, Pike and Clarenard On: 8 Gear Co., Wooster, Pike and Mariemont Aves., Cincinnati, Ohio.
Cleveland Worm & Gear Co., 3249 E. 80th St., Mariemont Aves., Cincinnati, Ohio.
Cleveland Worm & Gear Co., 3249 E. 80th St.,
Cleveland, Ohio.
Cone-Drive Gears Div., Michigan Tool Co.,
7200 E. McNichols Rd., Detroit, Mich.
Diefendorf Gear Corp., 920 N. Beldon Ave.,
Syracuse, N. Y.
Earle Gear & Mch. Co., 4707 Stenton Ave.,
Wayne Junction, Philadelphia 44, Pa.
Farrel-Birmingham Co., Inc., 25 Main St.,
Ansonia, Conn.
Gear Specialties, Inc., 2635 W. Medill Ave.,
Chicago 47, Ill.
Gleason Works, 1000 University Ave., Rochester
3, N. Y.
Greaves Mch. Tool Co., 2009 Eastern Ave.,
Cincinnati, Ohio.
Hartford, Special Mchry. Co., 287 Homestead
St., Hartford, Conn.
Illinois Gear & Mch. Co., 2120 No. Natchez
Ave., Chicago 35, Ill.
Mass. Gear & Tool Co., 36 Nassau St.,
Woburn, Mass.
Michigan Tool Co., 7171 E. McNichols Rd.,
Detroit 12, Mich.
New Jersey Gear & Mfg. Co., 1470 Chestnut
Ave., Hillside, N. J.
Ohio Gear Co., 1333 E. 179th St., Cleveland,
Ohio.
Perkins Mch. & Gear Co., Box 1611, Spring-Ave., Hillside, N. J.
Ohio Gear Co., 1333 E. 179th St., Cleveland,
Ohio.
Perkins Mch. & Gear Co., Box 1611, Springfield 2, Mass.
Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Pa.
Stahl Gear & Mch. Co., 3901 Hamilton Ave.,
Cleveland 14, Ohio.
Williamson Gear & Machine Co., 2606 Martha
St., Philadelphia 25, Pa.

GEARS, Rawhide and Non-Metallic

American Stock Gear Div., Perfection Gear Co., Harvey, III. Atlantic Gear Works, Inc., 200 Lafayette St., New York 12, N. Y. Boston Gear Works, Inc., North Quincy 71, Mass Braun Gear Co., 239 Richmond, Brooklyn 8, N. Y. N. Y.
Cincinnati Gear Co., Wooster, Pike and Mariemont Aves., Cincinnati, Ohio.
Diefendorf Gear Corp., 920 N. Beldon Ave., Syracuse, N. Y.
Earle Gear & Mch. Co., 4707 Stenton Ave., Wayne Junction, Philadelphia 44, Pa.
Gear Specialties, Inc., 2635 W. Medill Ave., Chicago 47, Ill.
Greaves Mch. Tool Co., 2009 Eastern Ave. Cincinnati, Ohio.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio. Ohio. Philadelphia Gear Works, Erie Ave. and G St., Philadelphia, Po.
Stahl Gear & Mch. Co., 3901 Hamilton Ave.,
Cleveland 14, Ohio.
Williamson Gear & Machine Co., 2606 Martha
St., Philadelphia 25, Pa.

GENERATORS, Electric

General Electric Co., Schenectady 5, N. Y. Lincoln Electric Co., (Arc) 22801 St. Clair Ave., Cleveland, Ohio. Reliance Elec. & Engrg. Co., Collinwood Sta., 1088 Ivanhoe Rd., Cleveland, Ohio.

GOGGLES

American Optical Co., Southbridge, Mass.

GRADUATING MACHINES

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.
Gorton, Geo., Mich. Co., 1110 W. 13th St., Racine, Wis.
Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.

GREASE

Cities Service Oil Co., 70 Pine St., New York. N. Y.
Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave.,
Philadelphia, Pa.
Lubriplate Div., Fiske Bros. Refining Co., 129
Lockwood St., Newark 5, N. J.
Pure Oil Co., 35 E. Wacker Drive, Chicago, III
Shell Oil Co., 50 West 50th St., New York.
N. Y.
Sinclair Refining Co., 630 5th Ave., New Sinclair Refining Co., 630 5th Ave., New York, N. Y. (Continued on page 326)

MORE PRODUCTION...Less Effort! 41" & 55" . **DEUTSCHE NILES** . 0 SINGLE COLUMN VERTICAL . TURRET . . . LATHE September/October . Delivery! For dependability, safety and extremely simple operation. . the DEUTSCHE NILES offers . many advantages. Speeds and . feeds are easily controlled. All levers, manual and rapid traverse settings are controlled from the operator's position. Idle time is reduced to a minimum. High speed steels and carbide tools can be used. It is possible to use the full power of the machine without overloading.



ring 71. ve., 1 8, and St., Co., ve., ve., St., ve., ster ve., ead hez St.,

Rd., tnut and,

ing-

St.,

ve.,

rtha

Gear

71, n 8, and ave.,

Ave.,

and, St.,

rtha

Ave.,

Sta.,

. E.

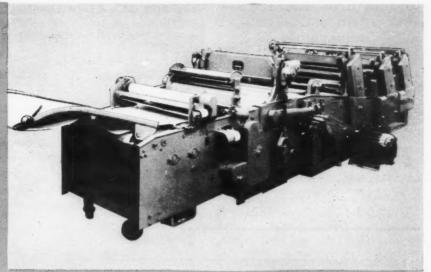
St.,

Ave.,

fork.

Pa. Ave.,

129

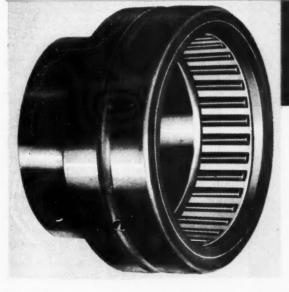


Crank Mechanism of Greer Biscuit and Cracker Cutting Machines

This improved cutting head eccentric operates on the reciprocating principle, at speeds of 50 to 200 strokes per minute. Orange Cage Type Needle Bearings replaced split type bronze bushings, to provide ample capacity within the available space—eliminate former run-in time—assure freedom from roller skewing and bearing trouble.

This Greer Biscuit and Cracker Cutting Machine is an ingenious, high speed machine. It rolls out biscuit or cracker dough to sheet form of desired thickness—cuts out shapes—separates the cut shapes from remaining sheet—and deposits them on the loading end of a band oven. As an example of its capacity, it can produce 1,500 to 6,000 lbs. of 2" soda crackers an hour, according to cutting speed selected. Manufactured by J. W. Greer Co., Cambridge, Mass., makers of continuous production machinery for the baking and confectionery fields.

gains positive protection against roller skewing



WRITE for Engineering Data Bulletin on Orange Cage Type Needle Bearings, showing construction, advantages, sizes, capacities, etc. Our engineers, convenient to every industrial center, are glad to discuss any application without obligation.

ORANGE Cage Type NEEDLE BEARINGS

Orange Cage Type Needle Bearings bring you all the high-load, small-space advantages of conventional needle bearings . . . PLUS the great feature of permanently aligned rollers. This has broadened their use to include successful application on vertical installations—spindles—overhung mountings—and relatively high speed installations. They are less affected by misaligned mountings and uneven loading.

Note that the square end rollers are retained in pockets of a free-floating, land-riding cage of anti-friction, non-ferrous metal. This prevents skewing while running and permits precision-controlled internal clearances for exacting requirements. All rollers and races are "Pentrate" finished to reduce corrosion and friction. Operation is extremely quiet and smooth—service records are exceptionally long and trouble-free.



ORANGE ROLLER BEARING CO., Inc. 552 Main St., Orange, N. J.

Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, III. Sun Oil Co., 1608 Walnut St., Philadelphia,

Pa.
Texas Co., 135 E. 42nd St, New York, N. Y.
Tide Water Associated Oil Co., 17 Battery
Place, New York, N. Y.

GRINDERS, Carbide Tool

Cosa Corp., 405 Lexington Ave., New York 17, N. Y.
Delta Power Tool Div., Rockwell Mfg. Co.,
614G N. Lexington Ave., Pittsburgh 8, Pa.
DoAll Co., 254 Laurel Ave., Des Plaines, III.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit
32, Mich.
Oliver Instrument Co., 1410 E. Maumee St.,
Adrian Mich.

Adrian, Mich.

GRINDERS, Die ond Mold

Consolidated Mch. Tool Corp., Rochester, N. Y. Pratt & Whitney, West Hartford 1, Conn. Rivett Lathe & Grinder, Inc., Brighton, Boston

GRINDERS, Oilstone, for Woodworking Tools

Mummert-Dixon Co., Hanover, Pa.

GRINDERS, Pneumatic

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Ingersoll-Rand Co., Phillipsburg, N. J. Madison-Kipp Corp., Madison, Wis. Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, III.

GRINDERS, Portable Electric and Toolpost

Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md. Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Mall Tool Co., 7740 S. Chicago Ave., Chicago,

Millers Falls Co., Greenfield, Mass. Skilsaw, Inc., 5033 N. Elston St., Chicago, III.

GRINDING FIXTURES

Geometric Tool Co. (Die Chaser), Westville Station, New Haven 15, Conn. Madison Mfg. Co., Muskegon Heights, Mich.

GRINDING MACHINES, Abrasive Belt

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio

Ohio.
Mattison Mch. Works, Rockford, III.
Matd Specialties Co., 4114 North Knox Ave.,
Chicago 41, III.
Porter-Cable Mch. Co., Salina St., Syracuse,
New York.
Walker-Turner Div., Kearney & Trecker Corp.,
South Ave., Plainfield, N. J.
Walls Sales Corp., 333 Nassau Ave., Brooklyn 22, N. Y.

GRINDING MACHINES, Bench

Atlas Press Co., 1253 N. Pitcher Ave., Kala-mazoo, Mich. Black & Decker Mfg. Co., E. Penna. Ave., Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md. Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis. Hardinge Bros., Inc., 1418 College Ave., Elmira, N. Y.
Millers Falls Co., Greenfield, Mass.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35. Mass.

35, Mass.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th
St., Chicago 18, III.
Walker-Turner Div., Kearney & Trecker Corp.,
South Ave., Plainfield, N. J.

GRINDING MACHINES, Broach

Colonial Broach Co., Detroit 13, Mich. Lapointe Mch. Tool Co., 34 Tower St., Hud-son, Mass.

GRINDING MACHINES, Camshaft

Landis Machine Co., Inc., Waynesboro, Pa. Norton Co., 1 New Bond St., Worcester 6, Mass.

GRINDING MACHINES, Carbide Tool

Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass.
Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. Delta Power Tool Div., Rockwell Mfg. Co., 614 G N. Lexington Ave., Pittsburgh 8, Pa. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Oliver Instrument Co., 1410 E, Maumee St., Instrument Co., 1410 E. Maumee St.,

Adrian, Mich.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Willey's Carbide Tool Co., 1340 W. Vernor
Hwy., Detroit 1, Mich.

GRINDING MACHINES, Centerless

Cincinnati Grinders, Inc., Cincinnati, Ohio.
Diversified Metal Products Co., 5125 Alcoa
Ave., Los Angeles 58, Calif.
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.
Landis Tool Co., Inc., Waynesboro, Pa.
Triplex Machine Tool Corp., 125 Barclay St.,
New York, N. Y.

step

the

Osl

sho

Osl

ano

tod Ave

OSB

GRINDING MACHINES, Chucking

Bryant Chucking Grinder Co., 257 Clinton St., Springfield, Vt. Landis Tool Co., Inc., Waynesboro, Pa.

GRINDING MACHINES, Crankshaft

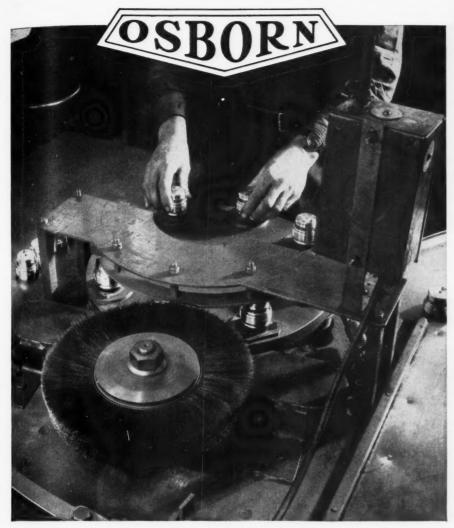
Landis Machine Co., Inc., Waynesboro, Pa. Norton Co., 1 New Bond St., Worcester 6, Mass.

GRINDING MACHINES, Cylindrical

Arter Grinding Mch. Co., 15 Sagamore Rd., Worcester 5, Mass. Brown & Sharpe Mfg. Co., Providence, R. I. Cincinnati Grinders, Inc., Cincinnati, Ohio. Cosa Corp., 405 Lexington Ave., New York 17, N. Y. N. Y.
DoAll Co., 254 Laurel Ave., Des Plaines, Ill.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Kelvin Systems Corp., 135 Front St., New York
5, N. Y.

(Continued on page 328)





ok-

ton 6th

6,

an-

St.,

St.,

17,

Why 400? Deburr 1400 per hour!

Here's how a manufacturer of brass components for ammunition has stepped up production with Osborn Power Brushing:

In the removal of feather burrs from threads and the machined surface of these brass parts, former output was 400 per hour. With the help of the Osborn Brushing Analyst, this company designed the brushing machine shown. The parts are placed on spindles of a rotating table. As they pass the Osborn Monitor Brush, they rotate and expose the entire face uniformly to the brush. Parts come clean and smooth... at a rate of 1400 per hour! And in another machine, Osborn Brushes deburr the internal threads of this part... smooth and fast!

Have the **OBA** show you production-boosting ideas for your shop! Call today or write, *The Osborn Manufacturing Company, Dept.* 785, 5401 Hamilton Avenue, Cleveland 14, Ohio.



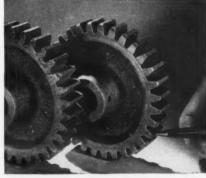
OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



"CENTERLESS BRUSHING" speeds the production of fine finishes for cylindrical parts such as this compressor piston. One user of this Osborn-developed method gets micro-smooth finishes at outputs as high as 10,000 pistons per 8 hours. Can be applied to many sizes of parts and types of material.



CLEANS SCALE. Heat treat scale on the tube at the left is removed by Osborn power brushing. Result, shown at right, is perfectly clean surface, ready for painting. Have an OBA study your product cleaning operations to find ways to cut their cost.



FASTER DEBURRING. Here's another "before and after" example of gear deburring with the Osborn Work Holder Brushing Lathe. Burrs and sharp edges are removed uniformly. Production increases of 20% to 1570% are being reported by users.

WHAT'S YOUR PROBLEM?

The Osborn Brushing Analyst will gladly help. Call him today!

MACHINERY, August, 1952—327

Landis Tool Co., Inc., Waynesboro, Pa. Norton Co., 1 New Bond St., Worcester 6,

Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass. Sheffield Corp., 721 Springfield, Dayton, Ohio. Triplex Machine Tool Corp., 125 Barclay St., New York, N. Y.

GRINDING MACHINES, Die Chaser

Eastern Mch. Screw Corp., New Haven, Conn. Landis Machine Co., Waynesboro, Pa.

GRINDING MACHINES, Disc

Besly-Welles Corp., Beloit, Wis. Gardner Machine Co., 414 E. Gardner St., Beloit, Wis. Mattison Machine Works, Rockford, III. Porter-Cable Machine Co., Salina St., Syracuse, N. Y.

GRINDING MACHINES, Drill

Blake, Edward, Co., 442 Cherry St., West New-Blake, Edward, Co., 442 Cherry St., West Newton 65, Mass.

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Gallmeyer & Livingston Co., 336 Straight Ave., S. W. Grand Rapids 4, Mich.

Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.

Union Twist Drill Co., Athol, Mass.

GRINDING MACHINES, Face

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.

N. Y. Mattison Machine Works, Rockford, III. Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.

GRINDING MACHINES, Flexible Shaft

See Flexible Shaft Equipment,

There's a Walker Magnetic Chuck for Every Known Application.



RELIABILITY — STRENGTH

The Walker "Concentric Gap" Magnetic Chuck meets day-in, day-out requirements for a powerful holding device. For more than forty years, with a basic electro-magnetic circuit, the Walker "Concentric Gap" Chuck has proven itself relia-

ble, efficient and economical.

LKER CO.Inc.

WORCESTER 6, MASSACHUSETTS

Original Designers and Builders of Magnetic Chucks

In Canada-Upton Bradeen & James, Ltd.

GRINDING MACHINES, Gop

Cincinnati Grinders, Inc., Cincinnati, Ohio. Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES, Gear Tooth

See Gear Grindina Machines.

GRINDING MACHINES, For Sharpening Cutters, Reamers, Hobs, Etc.

Barber-Colman Co., Rock and Montague, Rock-

UR

Bui

it pi shar tool

at al

Ave

the

SHA

floor save avai

1902

T

Barber-Colman Co., Rock and Montague, Rockford, Ill.
Blake, Edward, Co., 442 Cherry St., West Newton 65, Mass.
British Industries Corp., 164 Duane St., New York, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Mch. Co., Cincinnati, Ohio.
Cosa Corp., 405 Lexington Ave, New York 17,
N. Y.
Delta Power Tool Div., Rockwell Mfg. Co.,
614 G N. Lexington Ave., Pittsburgh 8, Pa.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Gallmeyer & Livingston Co., 336 Straight Ave.,
S. W. Grand Rapids 4, Mich.
Gorton, George, Mch. Co., 1110 W. 13th St.,
Racine, Wis.
Ingersoll Milling Mch. Co., 2442 Douglas St.,
Rockford, Ill.
Landis Tool Co., Waynesboro, Pa.
LeBlond, R. K., Mch. Tool Co., Madison and
Edwards Rds., Cincinnati 18, Ohio.
Norton Co., 1 New Bond St., Worcester 6,
Mass.
Oliver Instrument Co., 1410 E. Maumee St.,
Adrian, Mich.
Onsrud Machine Works, Inc., 3940 Palmer St.,
Chicago, Ill.
Orban, Kurt, Co., 21 West St., New York 6,

Chicago, III.
Orban, Kurt, Co., 21 West St., New York 6, N. Y.

N. Y. Pratt & Whitney, West Hartford 1, Conn. Thompson Grinder Co., 1500 W. Main St., Springfield, Ohio. Union Twist Drill Co., Athol, Mass.

GRINDING MACHINES, For Sharpening Turning and Planing Tools

Delta Power Tool Div., Rockwell Mfg. Co., 614 G N. Lexington Ave., Pittsburgh 8, Pa. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Oliver Instrument Co., 1410 E. Maumee St., Adrian, Mich.
Walker, O. S., Co., Inc., Worcester, Mass.
Waltham Machine Works, Newton St., Waltham, Mass.

GRINDING MACHINES, Internal

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.
Arter Grinding Mch. Co., 15 Sagamore Rd.,
Worcester 5, Mass.
Bryant Chucking Grinder Co., 257 Clinton St.,
Springfield, Vt.
Cosa Corp., 405 Lexington Ave., New York 17,
N. Y.
St. Coll C. Coss. 1200. Ockman, Blyd. Detail. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Heald Machine Co., 10 New Bond St., Wor-Heald Machine Co., 10 New Bond St., Wor-cester 6, Mass. Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y. Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass. Wicaco Machine Corp., Stenton Ave. and Lou-den St., Philadelphia, Pa.

GRINDING MACHINES, Jig

Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Moore Special Tool Co., Inc., 724 Union Ave., Bridgeport, Conn.
Pratt & Whitney, West Hartford 1, Conn.

GRINDING MACHINES, Knife and Shear Blade

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I. Hanchett Mfg. Co., Big Rapids, Mich. Hill Acme Co., 1201 W. 65th St., Cleveland 2, Mattison Machine Works, Rockford, III.

GRINDING MACHINES, Piston Ring

Gardner Machine Co., 414 E. Gardner St., Beloit, Wis.
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.
Lehmann Machine Co., 3560 Chouteau Ave.,
St. Louis, Mo.
Mattison Machine Works, Rockford, III.

(Continued on page 330)



It's easy to SHARPEN all types and sizes of BROACHES with this

VERSATILE LAPOINTE

UNIVERSAL BROACH SHARPENER

Built with simplified "Touch-Controls", it practically eliminates all need for skill in sharpening broaches. Any reasonably good tool man can do an expert job in no time at all!

ng Rock-

New-New

io. k 17,

Co.,

ring-

Ave.,

St.,

St., and er 6, St., St. k 6. St.,

ng

Po.

St.,

Wal-

rovi-

Rd.,

St., 17, troit Norve.,

ston

Lou-

ve.,

ear ovi-

d 2,

loit,

ve.,

We design and build a complete line of standard and special broaching machines, tools and fixtures.

Available in 3 SIZES: 60", 72" and 80" the LAPOINTE Universal BROACH SHARPENER occupies a surprisingly small floor area and will soon pay for itself in time saved and money earned. Attachments are available for backing-off.

Ask us about the **NEW 36" LAPOINTE** Broach Sharpener designed especially for surface broaches. This sharpener has no head and tail stock, but uses a vise only. "Touch-Control" enables the operator to remove a minimum of stock, thus prolonging the life of the tool.

Every plant that owns a broaching machine needs the LAPOINTE Manual on Broach Sharpening.

Ask for Booklet BSM-1

50 YEARS IN BROACHING We're the oldest in the world 1902 · GOLDEN ANNIVERSARY · 1952

THE LAPOINTE

MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS . U. S. A. Branch Factory: Watford, Herts., England

LAPOINTE

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES



Clutches get tough treatment in such high speed work as performed by the Sidney 32 in. Model 16 heavy duty lathe. Driving clutch is 8" Twin Disc Model CL, rated at 40.7 hp.

> necessary reserve to deliver, unfailingly, day after day performance in the most severe clutching service.

That, plus Twin Disc's unmatched service facilities, 8 Factory Branches and 60 Parts Stations, is why you find Twin Disc Clutches in the leading machine tools. Get the story in Bulletins 134-A and 120-D.

As designers come up with new machine performance achievements, they must have components that will stand the new gaff.

As "speed feed per minute" is stepped up with improved cutting tools, machine tool designers have to re-examine the ability of drive units to "take it." They find, of course, that Twin Disc's Machine Tool Clutches have the

Built for a long life . . . Backed for a lifetime

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin . HYDRAULIC DIVISION, Rockford, Illinois BRANCHES: CLEVELAND . DALLAS . DETROIT . LOS ANGELES . NEWARK . NEW ORLEANS . SEATTLE . TULSA

GRINDING MACHINES, Profile

Cleveland Grinding Machine Co., 1643 Eddy Rd., Cleveland 12, Ohio. Cosa Corp., 405 Lexington Ave., New York 17, N. Y. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Sheffield Corp., 721 Springfield, Dayton, Ohio.

GRINDING MACHINES, Radial, Ball Race, Etc.

Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES, Radius, Link

Consolidated Mch. Tool Corp., Rochester, N. Y. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

GRINDING MACHINES, Ring Wheel

Besly-Welles Corp., Beloit, Wis. Gardner Machine Co., 414 E. Gardner St., Beloit, Mattison Machine Works, Rockford, III. Standard Electrical Tool Co., 2500 River Rd., Cincinnati 4, Ohio.

GRINDING MACHINES, Roll

Farrel-Birmingham Co., 25 Main St., Ansonia, Conn. Landis Tool Co., Waynesboro, Pa. Norton Co., 1 New Bond St., Worcester 6,

GRINDING MACHINES, Spline Shaft

Kelvin System Corp., 135 Front St., New York 5, N. Y.

GRINDING MACHINES, Surface

GRINDING MACHINES, Surface

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.
Arter Grinding Mch. Co., 15 Sagamore Rd.,
Worcester 5, Mass.
Blanchard Machine Co., 64 State St., Cambridge, Mass.
British Industries Corp., International Machinery
Div., 164 Duane St., New York, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Delta Power Tool Div., Rockwell Mfg. Co.,
614 G N. Lexington Ave., Pittsburgh 8, Pa.
DoAll Co., 254 Laurel Ave., Des Plaines, III.
Gallmeyer & Livingston Co., 336 Straight Ave.,
S.W., Grand Rapids 4, Mich.
Gardner Machine Co. (Div. Landis Tool Co.),
414 E. Gardner St., Beloit, Wis.
Heald Machine Co., 10 New Bond St., Worcester 6, Mass.
Hill Acme Co., 1201 W. 65th St., Cleveland 2,
Ohio.
Mattison Machine Works, Rockford, III.
Norton Co., 1 New Bond St., Worcester 6,
Mass.
Pratt & Whitney, West Hartford 1, Conn. Norton Co., I New Bond St., Mass.
Mass.
Pratt & Whitney, West Hartford 1, Conn.
Sheffield Corp., 721 Springfield, Dayton, Ohlo.
Standard Electrical Tool Co., 2500 River Rd.,
Cincinnati 4, Ohio.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Thompson Grinder Co., 1500 W. Main St.,
Springfield, Ohio.
Walker, O. S., Co., Inc., Worcester, Mass.
Williams, White & Co., Moline, III.

GRINDING MACHINES, Top

Blake, Edward, Co., 442 Cherry St., West Newton 65, Mass.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.

GRINDING MACHINES, Thread

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Hirschmann, Carl, Co., 30 Park Ave., Manhaset, N. Y.
Jones & Lamson Mch. Co., 160 Clinton St.,
Springfield, Vt.
Landis Machine Co. (Centerless), Waynesboro, Po. Pa. Landis Tool Co. (Centerless), Waynesboro, Pa. Sheffield Corp., 721 Springfield, Dayton, Ohio.

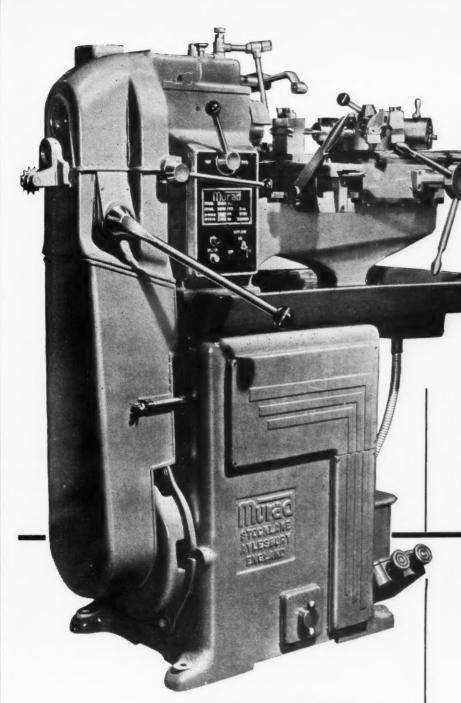
GRINDING MACHINES, Universal

Brown & Sharpe Mfg. Co., Providence, R. I. Cincinnati Grinders, Inc., Cincinnati, Ohio. Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y. Kelvin Systems Corp., 135 Front St., New York 5, N. Y. Landis Tool Co., Waynesboro, Pa. Norton Co., 1 New Bond St., Worcester 6, Mass.

cla

M

(Continued on page 332)



Eddy k 17, etroit Ohio.

N. Y.

eloit,

onia

York

Rd.

I. Co., Pa.

Pa. I. Ave.,

Co.), Wornd 2,

nio. Rd.,

St.,

lew-

troit

St.,

troit

lan-

St.,

oro,

'ork

6,

Murad

ram type turret lathe

Designed and built for increased and improved production, the MURAD ram type turret lathe has a proven record which more than justifies all the claims put forward on its behalf. Special features of design make it unexcelled anywhere for production capacity, accuracy and operative convenience.

* VIBRATION-FREE DRIVE

High spindle speeds with elimination of all vibration. Instant reversing possible because of cushioned drive.

* UNUSUALLY LARGE SPINDLE

With its Hyper-Precision preloaded bearings allow wide form cuts,

* SWINGING STOP

The only turret lathe with a swinging stop giving an extra turret tool position.

* MASSIVE BED

With special positioning of box type ribs giving rigidity and maintained accuracy.

* ROBUST CROSS SLIDE

Massive adjustable screw operated cross slide with Murad micrometer adjustable back tool slide.

* CONVENIENT CONTROLS

Come easily to the hand at the natural height for fast and easy operation.

* SPEEDY FOOT CONTROL

A choice of spindle speeds in the ratio of 1 to 4 instantly available by pedal control.

MURAD DEVELOPMENTS LIMITED, AYLESBURY, BUCKS, ENGLAND

GRINDING MACHINES, Worm

Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt. Pratt & Whitney, West Hartford 1, Conn.

GRINDING WHEELS

Bakelite Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y. Bay State Abrasive Products Co., Westboro, Mass.
Blanchard Machine Co., 64 State St., Cambridge, Mass.
Carborundum Co., Buffalo Ave., Niagara Falls, N. Y.
Cincinnoti Milling Machine Co., Grinding Wheels Div. Cincinnati, Ohio.
Gardner Machine Co. (Div. Landis Tool Co.), (Surface Grinder), 414 E. Gardner St., Beloit, Wis.
Hirschmann, Carl, Co., 30 Park Ave., Mana-

Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. Norton Co., I New Bond St., Worcester 6, Mass.

Precision Diamond Tool Co., 102 South Grove Ave., Elgin, Ill. (Diamond). Simonds Abrasive Co., Tacony and Fraley Sts., Bridesburg, Philadelphia, Pa.

GROOVING TOOLS, Internal

Waldes Kohinoor, Inc., 4716 Austel Place, Long Island City 1, N. Y.

GUARDS, Guide Pin

Central Safety Equipment Co., 2200 E. Huntingdon St., Philadelphia 25, Pa.

HAMMERS, Drop

Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio.
Chambersburg Engrg. Co., Chambersburg, Pa.
Columbia Machinery & Engineering Corp.,
Hamilton 1, Ohio.
Morgan Engrg. Co., Alliance, Ohio.
Williams, White & Co., Moline, III.

HAMMERS, Forging Air

Chambersburg Engrg. Co., Chambersburg, Pa.

HAMMERS, Pneumatic

Chambersburg Engrg. Co., Chambersburg, Pa. Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Ingersoll-Rand Co., Phillipsburg, N. J.

HAMMERS, Portable Electric

Black & Decker Mfg. Co., E. Penna Ave., Towson, Md. Millers Falls Co., Greenfield, Mass.

HAMMERS, Power

Chambersburg Engrg. Co., Chambersburg, Pa. Lobdell United Co., 2000 "G" St., Wilmington 99, Del.

HAMMERS, Shaft

S K.F. Industries, Inc., P. O. Box 6731, North Philadelphia, Pa. Standard Pressed Steel Co., Jenkintown, Pa.

HAMMERS, Soft

Chambersburg Engrg. Co., Chambersburg, Pa. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

HAMMERS, Steam

Chambersburg Engrg. Co., Chambersburg, Pa.

HARDENING EQUIPMENT

Lepel High Frequency Laboratories, Inc. (Induction), 55th St. and 37th Ave., Woodside 77, N. Y.
Ohio Crankshaft Co., 3800 Harvard Ave., Ohio Crankshatt Cleveland, Ohio.

HARDENING MACHINES, Flame

Cincinnati Milling Machine Co., Cincinnati, Ohio.

OW, fe w band

sitive r

as been Faster. om the

pull" in

The su

bstanti

placem ust be

The re

ng for-

creases

Cor

fice

C

SEE PHO

LO

HARDNESS TESTING INSTRUMENTS

Ames Precision Mch. Wks., Waltham, Mass. Shore Instrument & Mfg. Co., Van Wyck Ave., and Carll St., Jamaica, N. Y. Wilson Mechanical Instrument Co., Inc., 230-D Park Ave., New York, N. Y.

HEADING MACHINES

National Machinery Co., Greenfield and Stanton Sts., Tiffin, Ohio.

HEAT-TREATING EQUIPMENT

Ipsen Industries, Inc., 536 No. Madison, Rockford, III.

HEAT-TREATMENT OF METALS

Bennett Metal Treating Co., Elmwood, Conn.

HOBBING MACHINES

See Gear Cutting Machines, Spur and Helical Gears (Hobbing), and Gear Cutting Machines, Worm and Worm Wheels.

HQBS

Barber-Colman Co., Rock and Montague, Rockford, III.

Brown & Sharpe Mfg. Co., Providence, R. I.

Michigan Tool Co., 7171 E. McNichols Rd.,

Detroit 12, Mich.

National Twist Drill & Tool Co., Rochester, Mich. New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J. Union Twist Drill Co., Athol, Mass.

HOIST HOOKS

Bethlehem Steel Co., Bethlehem, Pa. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

HOISTING AND CONVEYING EQUIPMENT

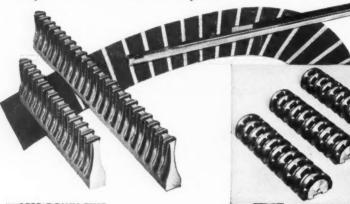
Cleveland Crane & Engrg. Co., Wickliffe, Ohio. Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

(Continued on page 334)

pecialists in Designing and Fredering Carbide Cutting Tools

CARBIDE TIPPED **BROACHES**

for Broaching Cast Iron!



- LESS DOWN-TIME
- MORE PIECES PER GRIND
- . FINER FINISHES

WESSON

ARBIDE tipped broaches are new but Wessonmetal cemented carbide and Wesson Carbide tools are designed and produced with the combined skills of top metallurgists and specialists in carbide cutting tool fabrication. Broaching with Wesson-

metal will mean less down-time, more pieces per grind, smooth cutting through scale, sand loaded areas and hard spots.

GET A QUOTATION ON WESSON CARBIDE TIPPED BROACHES FOR YOUR JOB TODAY. WRITE DIRECT OR ASK YOUR WESSON REPRE-SENTATIVE.

WESSON COMPANY Affiliated with WESSON METAL CORPORATION 1220 WOODWARD HEIGHTS BLVD. . FERNDALE (DETROIT 20), MICH



Faster, free cutting with less feed pressure results om the hooked, claw-like teeth which actually pull" into the material being sawed.

The superhard teeth give longer blade life with abstantially higher cutting efficiency up to time of eplacement than that of non-hardened blades which bust be resharpened periodically.

The result is a blade that industry has been waitng for-a blade that reduces bandsawing costs and acreases production when properly applied.

Ask for Literature

S

30-D

ock-

ear orm

ock-

Rd.,

ster,

tnut

falo

Complete information, prices, specifications available upon request. Call your local DoALL Sales-Service Store or write:

THE DOALL COMPANY 254 N. Laurel Ave., Des Plaines, III.

Eliminates Resharpening and Resetting—it's cheaper to replace long-lived Claw Tooth blades than to use blades which must be resharpened a number of times during their life.

Increases Production — more output per machine and manhour because of faster cutting and elimination of blade removal for resharpening.

Cuts Costs—higher production and elimination of blade maintenance labor and equipment means lower bandsawing costs.















BAND MACHINES SURFACE GRINDERS

GAGE BLOCKS GAGING EQUIPMENT

MOBILE INSPECTION U

HOISTS, Air

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Hanna Engineering Works, 1752 Elston Ave., Chicago, III. Chicago, III.
Ingersoll-Rand Co., Phillipsburg, N. J.

HOISTS, Chain, Etc.

Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.

HOISTS, Electric

Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa. Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

HONES

Carborundum Co., Buffalo Ave., Niagara Falls, Moline Tool Co., 102 20th St., Moline, III. Norton Co., 1 New Bond St., Worcester 6, Mass.

HONING MACHINES, Internal (Cylinder)

Barnes Drill Co., 814 Chestnut, Rockford, III. Barnes, W. F. & John, Co., 201 S. Water St., Rockford, III.

Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4 Mich Moline Tool Co., 102 20th St., Moline, III.

HONING MACHINES, External

Barnes Drill Co., 814 Chestnut, Rockford, III. Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich.

HONING TOOLS AND FIXTURES

Barnes Drill Co., 814 Chestnut St., Rockford,

Micromatic Hone Corp., 8100 Schoolcraft, De-troit 4, Mich.

HOSE, Leather, Rubber, Metallic, Etc.

American Metal Hose Br. American Brass Co., 25 Broadway, New York, N. Y. Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N. J.

HYDRAULIC MACHINERY, **Tools and Equipment**

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio. Baldwin-Lima-Hamilton Corp., Philadelphia 42,

Barnes, John S., Corp., Rockford, III. Bethlehem Steel Corp., Bethlehem, Pa. Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa. Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton,

Ohio.
Chambersburg Engrg. Co., Chambersburg, Pa.
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.
Denison Engrg. Co., 1160 Dublin St., Columbus
16, Ohio.
Farquhar, A. B., Co., 21 Duke St., York, Pa.
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,
III.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio. Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.
Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.
Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.

WIS.
Rockford Mch. Tool Co., 2500 Kishwaukee St.,
Rockford, III.
Sundstrand Mch. Tool Co., 2531 11th St.,
Rockford, III.

KOCKTOTA, III. Watson-Stillman Co., Aldene Rd., Roselle, N. J. Williams, White & Co., Moline, III. Wilson, K. R., 215 Main St., Buffalo, N. Y.

HYDRAULIC POWER UNITS OR TOOL HEADS

Barnes Drill Co., 814 Chestnut, Rockford, Ill. Barnes, John S., Corp., Rockford, Ill. Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, HII.
Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
Mt. Gilead, Ohio.
Rivett Lathe & Grinder, Inc., Brighton, Boston
35, Mass.

INDEXING AND SPACING EQUIPMENT

Abrasive Mch. Tool Co., Dexter Rd., E. Providence 14, R. I.
Brown & Sharpe Mfg. Co., Providence, R. I.
Engis Equipment Co., 431 S. Dearborn St., Chicago 5, III.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Hirschmann, Carl, Co., 30 Park Ave., Manhaset, N. Y.
Kempsmith Machine Co., 1819 S. 71st St., Milwaukee 14, Wis.
Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, III.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.
Vinco Corp., 8855 Schaefer Highway, Detroit Sundstrand Mch. Tool Co., 2531 11th St., Rock-ford, III. Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich. Zagar Tool, Inc., 24000 Lakeland Blvd., Cleve-land 23, Ohio.

INDICATORS, Dial

Ames, B. C., Co., Waltham 54, Mass. Brown & Sharpe Mfg Co., Providence, R. I. DoAll Co., 254 Laurel Ave., Des Plaines, III. Federal Products Corp., P. O. Box 1027, Providence, R. I.

Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.

Standard Gage Co., Inc., Poughkeepsie, N. Y.

Starrett, The L. S., Co., Athol, Mass.

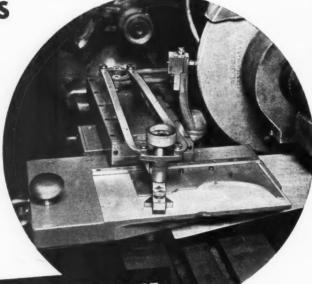
INDICATORS, Speed

Bristol Co., Platts Mills, Waterbury, Conn. Brown & Sharpe Mfg. Co., Providence, R. I. Starrett, The L. S., Co., Athol, Mass. Veeder-Root, Inc., 20 Sargent St., Hartford,

INDICATORS, Test

Ames, B. C., Co., Waltham 54, Mass. Brown & Sharpe Mfg. Co., Providence, R. I. Federal Products Corp., P. O. Box 1027, Providence, R. I. (Continued on page 336)

FOR CYLINDRICAL GRINDERS



GET ACCURATE, LOW COST CONTOUR WHEEL DRESSING THE (")AGN)-FOR(") WAY!

Speed up contour wheel dressing on cylindrical grinders! The MAGNI-FORM Universal Contour Wheel Dresser produces continuous complex contours rapidly and accurately, following any contour that can be entered by the diamond. Check these features and compare!

- 1. "Tenths" accuracy at once.
- 2. Simple manual operation does not require high skill. 3. Mounted back of foot-stock for quickly re-dressing of wheel.
- 1" capacity uses 10:1 ratio and 2" capacity uses 5:1 ratio templates that are easy to make and change.
- Simple ratio mechanism and slide is without complicated linkages.

MAGNI-FORM Universal Contour Wheel Dressers put cylindrical contour grinding on a really efficient basis. Write full details in Bulletin M.



HOGLUND

ENGINEERING AND MANUFACTURING CO. INC. BERKELEY HEIGHTS N. J.

MADE IN 3 TYPES

Universal Contour Wheel Dresser—for all types of horizontal spindle surface grinders with 1" and 2" wide wheels. Manually operated.

2. Automatic Contour Wheel Dresser—for precision dress-ing of wheels for production form grinding of Gear and Spline Profiles, Thread Forms, Gas Turbine Bucket Root Forms, etc.

3. Universal Contour Wheel Dresser—for Cylindrical Grinders with 1" and 2"

Special Dressers for Aircraft Gear Grinding — producing a perfect blend between in-volute form and root fillet— AUTOMATICALLY.



This starter switch for a refrigerator motor presents a tough assembly and inspection problem. The springs must be accurately bent and adjusted by hand—tolerances are close.

With the Kodak Contour Projector the whole operation—bending and checking—may be done at the same time and under the magnification that's most convenient.

Since the Kodak Contour Projector has provisions for surface illumination from the same lens that picks up the image, every detail of the switch is shown on the screen. A 45° mirror permits the part to be mounted flat for easy accessibility. Both to adjust the part and check tolerances, the operator simply compares the magnified image with a chart-gage laid on the bright screen.

Whether your interest is in large parts or small

parts, simple parts or complex parts with many dimensions, a Kodak Contour Projector will do the job quickly, completely, and accurately. The operator can work in a lighted room unhampered by hoods or curtains. And little training is required to get the work out in a hurry.

For rapid, routine inspection and adjustment work, the economical, stripped-down Kodak Contour Projector, Model 3, will meet your requirements. For toolroom measurement, the versatile Model 2A is what you need. In your area there is an experienced field engineer who will be glad to discuss your own particular problems. You can get in touch with him by writing Eastman Kodak Company, Industrial Optical Sales Division, Rochester 4, N. Y.

the KODAK CONTOUR PROJECTOR



Co..

nati

42,

Pa.

i. ago, k 1, Buf-Rd., st., St.,

roit

ton

St.,

ead

ŝŧ.,

ee

k-

A new sound movie shows how to simplify complex inspection problems. We'll tell you how to get it for a showing.

Kodak

Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y. Standard Gage Co., Inc., Poughkeepsie, N. Y. Starrett, The L. S., Co., Athol, Mass.

INDUCTION HEATING EQUIPMENT

General Electric Co., Schenectady, N. Y. Lepel High Frequency Laboratories, Inc., 55th St. and 37th Ave., Woodside 77, N. Y. Ohio Crankshaft Co., 3800 Harvard Ave., Cleveland, Ohio.

INTENSIFIERS, Hydraulic

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.
Farquhar, A. B., Co., 21 Duke St., York, Pa.
Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
Mt. Gilead, Ohio.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y.

Morgan Engrg. Co., Alliance, Ohio. Watson-Stillman Co., Aldene Rd., Roselle, N. J.

JACKS, Planer

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.

JIG BORER

See Boring Machines, Jig.

JIGS AND FIXTURES

Allied Products Corp., 12677 Burt Rd., Detroit 23, Mich.
Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio.
Columbus Die, Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Ingersoll Milling Machine Co., 2442 Douglas St., Rockford, Ill.
Jañn, B., Manufacturing Co., Ellis St., New Britain, Conn.

Northwestern Tool & Engrg. Co., 117 Hollier,
Dayton, Ohio.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.
Sundstrand Machine Tool Co., 2531 11th St.,
Rockford, Ill.
Vinco Corp., 8855 Schaefer Highway, Detoil
27, Mich.

Woodworth, N. A., Co., 1300 E. Nine Mile Rd., Detroit 20, Mich.

JOINTS, See Fittings, Hydraulic, Pneumatic, Etc.

KEYSEATERS

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio. Consolidated Mch. Tool Co., Rochester, N. Y. Davis Keyseater Co., 225 Mill St., Rochester, N. Y. N. Y. Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass. Mitts & Merrill, 68 Holden St., Saginaw, Mich.

KNURL HOLDERS

Brown & Sharpe Mfg. Co., Providence, R. I. Pratt & Whitney, West Hartford 1, Conn.

KNURLING TOOLS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Pratt & Whitney, West Hartford 1, Conn. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

LAPPING MACHINES

Cincinnati Grinders, Inc. (Centerless), Cincinnati, Ohio. Crane Packing Co., 1800 Cuyler Ave., Chicago, III. (Lapmaster Div.). Fellows Gear Shaper Co., 78 River St., Springfield, Vt. field, Vt.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Michigan Tool Co., 7171 E. McNichols Rd.,
Detroit 12, Mich.
Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich.
Norton Co., 1 New Bond St., Worcester 6,

LATHE AND GRINDING DOGS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

LATHE ATTACHMENTS

American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio.
Atlas Press Co., 1253 N. Pitcher St., Kalamazoo, Mich.
Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio.
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.
Hendey Machine Co., Torrington, Conn.
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.
Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio.
Pratt & Whitney, West Hartford 1, Conn.
Reed-Prentice Corp., 677 Cambridge St., Worcester, Mass.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Rockford, Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.
Seneca Falls Mch. Co., Seneca Falls, N. Y.
Sidney Machine Tool Co., Sidney, Ohio.
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.
Springfield Mch. Tool Co., Springfield, Ohio.
Sundstrand Mch. Tool Co., Springfield, Ohio.
Sundstrand Mch. Tool Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

LATHE CONVERTER

Master Mfg. Co., Hutchinson, Kansas,

LATHES, Automatic

Bullard Co., Brewster St., Bridgeport 2, Conn. Cone Automatic Mch. Co., Inc., Windsor, Vt. Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. (Continued on page 338)



Internal grinding head with the work head swivelled.

Arter Model 103 is one of a line of precision grinders of many types which we have been building for over thirty years. This relatively low-priced grinder is a dual purpose machine that can be arranged as a Plain Cylindrical Grinder or, by changing wheelheads, as an Internal Grinder. It is designed for use wherever a small-in-capacity machine is needed as prime equipment or as an auxiliary to larger machines.

Write today for complete



KUX

Hollier

Ohio, od, III. th St., Detroit

e Rd.

101, . Y. nester,

Mich.

1.

trong

uffalo

incin-

Man-

Rd..

, De-

er 6,

trong

ffalo

eston

isney

Ave.,

St.,

and Ave.,

iney,

Wor-

ston

ukee

dison

St.,

Ave.,

FIRST NAME IN DIE CASTING MACHINES

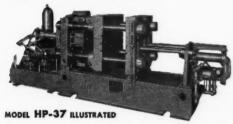


-helps make May tag
first name in washers

Since 1907, over 6 million Maytag Washers have been sold—far more than any other. The reason's clear; Maytag makes a wonderful washing machine . . . plus a full line of other home laundry equipment and famous Dutch Oven Ranges. It's logical that KUX, first name in die casting machines, should be used in the quality production of these superior products.

The use of KUX die casting equipment can put YOUR PRODUCT ahead—or keep it ahead. Reduce your manufacturing costs—increase the saleability of your product, with quality die castings made on these rugged machines.

Write for illustrated catalog showing complete line of KUX Die Casting Machines.



Hydraulically operated die casting machine for production of aluminum castings.

KUX MACHINE COMPANY 6725 N. Ridge • Chicago 26, Illinois

KUX

FIRST NAME IN DIE CASTING MACHINES SELECTED BY FIRST NAMES IN INDUSTRY production begins with

Columbus Die-Tool

It takes the right machinery to build your product right!

Columbus Die-Tool individually designs and builds tools, dies, and special machinery to produce your product alone. This gives you the advantages of lower operating cost, greater production and a higher quality product.

Let Columbus Die-Tool's more than 46 years of designing and engineering experience go to work for you. Contact CDT today about your special die, tool and machinery requirements.



Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.
Goss & DeLeeuw Mch. Co., Kensington, Conn. Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt. LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio. National Acme Co., 170 E. 131st St., Cleveland,

New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn. Porter-Cable Machine Co., Salina St., Syracuse, N. Y.

Potter & Johnston Co., 1027 Newport Ave.,

Potter & Johnston Co., 1027 Newport Ave., Pawtucket, R. I. Pratt & Whitney, West Hartford 1, Conn. Russell, Holbrook & Henderson, Inc., 292 Madi-son Ave., New York 17, N. Y. Seneca Falls Mch. Co., Seneca Falls, N. Y. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

LATHES, Axle

Consolidated Mch. Tool Corp., Rochester, N. Y. LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio. Seneca Falls, Mch. Co., Seneca Falls, N. Y. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

LATHES, Bench

Ames Precision Mch. Works, Waltham, Mass. Atlas Press Co., 1253 N. Pitcher St., Kalamazoo, Mich. British Industries Corp., International Mchry. Div., 164 Duane St., New York, N. Y. Cosa Corp., 405 Lexington Ave., New York 17, N. Y.

N. Y.
Hardinge Bros., Inc., 1418 College Ave.,
Elmira, N. Y.
LeBlond, R. K., Mch. Tool Co., Madison and
Edwards Rds., Cincinnati 18, Ohio.
Pratt & Whitney, West Hartford 1, Conn.
Rivett Lathe & Grinder, Inc., Brighton, Boston

Seneca Falls Mch. Co., Seneca Falls, N. Y. Sheldon Mch. Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, III. South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind. LATHES, Boring

Bullard Co., Brewster St., Bridgeport 2, Conn.
Gisholt Machine Co., 1245 E. Washington Ave.,
Madison 10, Wis.
LeBlond, R. K., Mch. Tool Co., Madison and
Edwards Rds., Cincinnati 18, Ohio.
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.
Sidney Machine Tool Co., Sidney, Ohio.

LATHES, Crankshaft

Consolidated Mch. Tool Corp., Rochester, N. Y. LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

LATHES, Double-End

Consolidated Mch. Tool Corp., Rochester, N. Y. LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio. Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.
Sundstrand Mch. Tool Co., 2531 11th St.,
Rockford, III.

LATHES, Duplicating

H. E. B. Mch. Tools, Inc., 341 Madison Ave., New York 17, N. Y. Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo. Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio Ohio. Sidney Machine Tool Co., Sidney, Ohio.

LATHES, Engine and Toolroom

LATHES, Engine and Toolroom

American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio.

Atlas Press Co., 1253 N. Pitcher St., Kalamazoo, Mich.

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Callif.

Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati Py, Ohio.

Consolidated Mch. Tool Corp., Rochester, N. Y.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.

Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.

H. E. B. Mch. Tools, Inc., 341 Madison Ave., New York 17, N. Y.
Hendey Machine Co., Torrington, Conn.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.

LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.

Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo. Edwards Rds., Cincinnati 18, Ohio.
Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.
Logan Engrg. Co., 4901 W. Lawrence Ave., Chicago 30, Ill.
Monarch Machine Tool Co., 27 Oak St., Sidney, Ohio.
Morey Mchry. Co., Inc., 410 Broome St., New York, N. Y.
Nebel Machine Tool Co., 3401 Central Pkwy. Cincinnati 25, Ohio.
Pratt & Whitney, West Hartford 1, Conn.
Reed-Prentice Corp., 677 Cambridge St., Worcester, Mass.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.
Seneca Falls Mch. Co., Seneca Falls, N. Y.
Sheldon Machine Tool Co., 1600 N. Broadway, Albany, N. Y.
South Bend Lathe Works, Inc., 425 E. Madison St., South Bend, Ind.
Springfield Mch. Tool Co., Springfield, Ohio.
LATHES. Gab

bas

eac

era

par

Co

pro

shi

sha

hea

sha

five

tion

aut

que

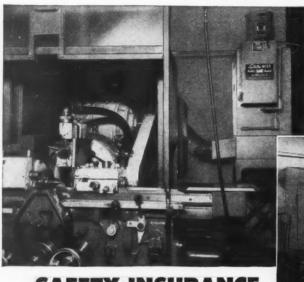
nes

LATHES, Gap

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif.
Cincinnati Lathe & Tool Co., 3207-3211 Disney St., Oakley, Cincinnati 9, Ohio.
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.
H. E. B. Mch. Tools, Inc., 341 Madison Ave., New York 17, N. Y.
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.
Cincinnati 25, Ohio.

(Continued on page 340)

todays best buy is better air!



Electro-Mist provides complete oil mist control for thread grinder at Lear. Inc., Grand Rapids



SAFETY INSURANCE

for high speed cutting and grinding!

Electro-Mist unit collector eliminates oil mist and smoke at the source.

The hazards created by coolants and the nuisance of oil mist and smoke from high speed grinding and cutting operations are completely controlled by AAF's Electro-Mist collector. A self-contained unit designed specifically for this purpose, the Electro-Mist exhausts material at the source by combining heavy duty industrial filters with electronic precipitation. Its unique design allows easy removal of collector plate assemblies, as well as access to all parts . . . without tools . . . thus reducing maintenance time to a minimum.

The Electro-Mist also salvages as much as 2 to 5 gallons of coolant daily in its oil reservoir, which may be piped back into the machine or drained off, as desired. The above illustrations show how the plastic front of the hood may be raised for observation or adjustment, or when lowered, provides complete enclosure for the grinding or cutting operation.

If you are interested in safer, cleaner high speed grinding and cutting operations call your AAF representative today or write for complete details on Electro-Mist contained in AAF Engineering Bulletin No. 251.



merican A COMPANY, INC.

250 Central Avenue, Louisville 8, Kentucky American Air Filter of Canada, Ltd., Montreal, P. Q. Pacific Division Office, San Francisco, California



Cin-

and St.,

St...

Nan-Nve., ney,

ston imarnon

1. Y. 17, 17,

Ave., Aanand

Cin-

ney,

New

kwy.

Nor-

ston

ukee

(nox

oad-

lison

rnon

sney

Ave.



1600 basket shafts are hardened on this machine in an eight-hour shift . . . while this heater silver-solders high-strength joints, three to a cycle.

"VERSATILE G-E INDUCTION HEATERS CUT COSTS 48%" SAYS EASY WASHER

SYRACUSE PLANT SAVES TIME, LABOR, MONEY WITH INDUCTION HEAT

"We cut the entire cost of hardening basket shafts from \$.13 each to \$.0675 each," says Mr. Victor Barden, General Foreman of the Heat-treat Department at Easy Washing Machine Company. Formerly done by a cyanide process, this operation required three shifts of two men each to harden 1600 shafts. Now, with one G-E induction heater, one man can harden 1600 shafts in an eight-hour shift, releasing five skilled men for other work.

Better hardness characteristics are shown by samples tested after induction heating and quenching. Exact automatic control of heating and quenching times gives uniform hardness to every shaft. In four years of use, the only maintenance cost has been for replacing two electronic tubes.

Versatile G-E induction heaters at Easy are also used for soldering, brazing, and annealing with comparable results. Says Mr. F. L. Taylor, Factory Manager, "We are very pleased with these heaters because they enable us to improve quality and reduce costs on many washer components."

Selective heating for annealing, brazing, soldering and hardening can be done faster and at lower cost by putting G-E induction heaters to work in your plant. For more information, just contact the G-E Sales Office nearest you, or clip the coupon below. General Electric Co., Schenectady, N. Y.

Sec.B 720-83, General Electric Co., Schenectady 5, N. Y.

Please send me a copy of Bulletin GEA-4945, "Induction Heating in Industry."

- ☐ for reference
- ☐ for immediate project

1401110....

Company

Street..

City.

State

GENERAL EBELECTRIC

Lodge & Shipley Co., 3055 Colerain Ave., Nebel Machine Tool Co., 3401 Central Pkwy. Cincinnati 25, Ohio. Seneca Falls Mch. Co., Seneca Falls, N. Y. Sidney Machine Tool Co., Sidney, Ohio. Springfield Mch. Tool Co., Springfield, Ohio. Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

LATHES, Gun

Consolidated Mch. Tool Corp., Rochester, N. Y. LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio. Lehmann Machine Co., 3560 Chouteau Ave., St. Louis Mo. St. Louis, Mo. Seneca Falls Mch. Co., Seneca Falls, N. Y.

LATHES, Hollow Spindle

Axelson Mfg. Co., P. O. Box 15335, Vernon Sta., Los Angeles 58, Calif. LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio. Lehmann Machine Co., 3560 Chouteau Ave., St. Louis, Mo.

Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

LATHES, Manufacturing Type

Lipe-Rollway Corp., 806 Emerson Ave., Syracuse, N. Y. cuse, N. Y.
odge & Shipley Co., 3055 Colerain Ave.,
Cincinnati 25, Ohio.

LATHES, Spinning

Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio. Ferracute Machine Co., Bridgeton, N. J.

LATHES, Toolroom

See Lathes, Engine and Toolroom.

LATHES, Turret

Bardons & Oliver, Inc., Ft. W. 9th St., Cleveland 13, Ohio.

British Industries Corp., International Mchry.
Div., 164 Duane St., New York, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Co., Brewster St., Bridgeport 2, Conn.
Cosa Corp., 405 Lexington Ave., New York 17,
N. Y.

Cosa Corp., 405 Lexington Ave., New York 17, N. Y.
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.
Hardinge Brothers, Inc. (Bench or Cabinet Mounting), 1418 College Ave., Elmira, N. Y.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt.
LeBlond, R. K., Mch. Tool Co., Madison and Edwards Rds., Cincinnati 18, Ohio.
Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.
Millholland, W. K., Mchry. Co., 6402 Westfield Bivd., Indianapolis 5, Ind.
Morey Mchry. Co., Inc., 410 Broome St., New York, N. Y.
Murad Developments Ltd., Aylesbury, Bucks, England.

Murad Developments Lion, England.
Potter & Johnston Co. (Automatic), 1027 Newport Ave., Pawtucket, R. I.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.

Albany, N. Y.
South Bend Lathe Works, 425 E. Madison St.,
South Bend, Ind.
Springfield Mch. Tool Co., Springfield, Ohio.
Warner & Swasey Co., 5701 Carnegie Ave.,
Cleveland 3, Ohio.

LATHES, Vertical Turret

American Steel Foundries, King Mch. Tool Div., Paddock Rd. and Tennessee Ave., Cincin-Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.
Bullard Co., Brewster St., Bridgeport 2, Conn.
Lehmann, J. M., Co., Inc.., 55 New York Ave.,
Lyndhurst, N. J.
Rogers Machine Works, Inc., Buffalo 10, N. Y.

LEVELS

Bullard Co., Brewster St., Bridgeport 2, Conn. Millers Falls Co., Greenfield, Mass. Pratt & Whitney, West Hartford 1, Conn. Starrett, The L. S., Co., Athol, Mass.

LOCKNUTS

Standard Locknut & Lockwasher, Inc., 510 N. Capitol Ave., Indianapolis, Ind.

LUBRICANTS, Including Extreme Pressure (EP) Machinery Lubricants

Cities Service Oil Co., 70 Pine St., New York, Cities Service Oil Co., 70 Pine St., New York, N. Y.
Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.
Houghton, E. F., & Co., 303 W. Lehigh Ave.,
Philadelphia, Pa.
Lubriplate Div., Fiske Bros. Refining Co., 129
Lockwood St., Newark 5, N. J.
Pure Oil Co., 35 E. Wacker Driver, Chicago, Ill.
Shell Oil Co., 50 West 50th St., New York,
N. Y.
Sinclair Refining Co., 630 5th Ave. New York N. Y.
Sinclair Refining Co., 630 5th Ave., New York, N. Y.
Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, III.
Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St., Chicago 23, III.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Texas Co., 135 E. 42nd St., New York, N. Y.
Tide Water Associated Oil Co., 17 Battery Place, New York, N. Y.

LUBRICATING SYSTEMS

Bawser, Inc., 1365 E. Creighton Ave., Fort Wayne, Ind. Farval Corp., 3249 E. 80th St., Cleveland, Ohio. Madison-Kipp Corp., Madison, Wis. Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill. Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

MACHINISTS' SMALL TOOLS

See Calipers, Hammers, Wrenches, Drills, Tap, Etc.

MANDRELS

See Arbors and Mandrels.

MARKING MACHINES AND DEVICES

Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit, Mich.

(Continued on page 342)





Write for this data-packed Bulletin . . . TODAY!

NOW . . . a 60-ton power press with all the famous Press-Rite features! Available in either flywheel or back-geared models, the Press-Rite No. 60 is designed with extra frame rigidity to practically eliminate deflection on heavy drawing and blanking operations. The large die space simplifies handling of bulky dies . . . cuts set-up time. The Press-Rite Airflex Clutch and Brake System delivers full stroke power through every operating cycle . . . provides positive, instantaneous braking action. High production . . . low maintenance . . . long dependable operation—these advantages make the Press-Rite No. 60 a profitable addition to your production line.

Sales Service Machine Tool Co. PRESS RITE PRESSES . SHAPE RITE SHAPERS . KELLER POWER HACK SAWS 2351 UNIVERSITY AVENUE · ST. PAUL 4, MINNESOTA

how would you produce these jobs?

IN THESE QUANTITIES

850 PIECES SIZE: 11½"x 17"x .040" thick

ichry. I. onn. rk 17,

Ave.,

n St., n and

Ave.,

, New

Bucks, New-Boston

dway,

on St., nio. Ave.,

Div., Cincin-Conn. Ave., N. Y.

Conn.

10 N.

ts

York,

, 129 go, III. York,

York,

higan,

oy St., ia, Pa. I. Y. iattery

Fort

Ohio.

er St.,

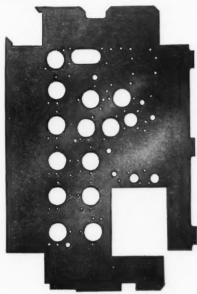
Boston

s,

CES r Sta.,



75 PIECES SIZE: 8" x 10"



TIME: 6.2 minut



TIME: 4.5 minutes

TIME: 6.2 minutes each floor to floor including set-up

TIME: 55 seconds each floor to floor including set-up

without

LAYOUT BURNING DRILLING MULTIPLE HANDLINGS STRAIGHTENING TIME FLY CUTTING

and at absolute minimum tool cost

These jobs, times, and costs are typical—users of Wiedemann Turret Punch Presses are meeting these figures every day—day in and day out.

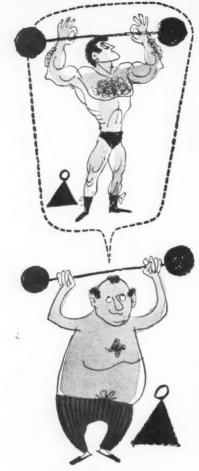
IN THESE TIMES (including set-up)

Why not write for a Wiedemann Analysis and Data Sheet for recommendation on your pierced work? No obligation.

NO JOB TOO LARGE ... NO RUN TOO SMALL

WIEDEMANN MACHINE COMPANY

4205 WISSAHICKON AVE . PHILADELPHIA 32, PA.



better taper?

Torrington Swaging Machines taper both tubular and solid work quickly, accurately and economically. Delivering 4000 hammer blows a minute, the swager gives the metal toughness and resiliency...uti-

lizes all the stock.



Our booklet, "The Torrington Swaging Machine," describes the art of swaging and illustrates the complete line of Torrington Swagers. Write for your free copy ... today!

THE TORRINGTON COMPANY

Swager Department

558 Field Street • Torrington, Conn. Makers of

TORRINGTON NEEDLE BEARINGS

MEASURING MACHINES AND INSTRUMENTS, PRECISION

Federal Products Corp., P. O. Box 1027, Provi-Federal Products Corp., P. O. Box 1027, Providence, R. I.
Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.
Norma-Hoffmann Bearings Corps., Stamford,
Conn.
Pratt & Whitney, West Hartford 1, Conn.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Starrett, The L. S., Co., Athol, Mass.
Van Keuren Co., 176 Waltham St., Watertown,
Boston, Mass.
Vinco Corp., 8855 Schaefer Highway, Detroit
27, Mich.

MEASURING WIRES, THREAD, SPLINE AND GEAR

Van Keuren Co., 176 Waltham St., Watertown, Boston, Mass.

METAL, Bearings

See Bearings, Bronze, Babbitt, Etc., and Bushings, Brass, Bronze, Etc.

See Recording Instruments.

MICROMETERS

MICROMETERS

Ames, B. C., Co. (Dial), Waltham 54, Mass.
Bath, John, Co., Inc., Worcester, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Inter-Continental Trading Corp., 90 West St.,
New York 6, N. Y.
Millers Falls Co., Greenfield, Mass.
Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Starrett, The L. S., Co., Athol, Mass.
Van Keuren Co., 176 Waltham St., Watertown,
Boston, Mass.

MICROSCOPES, Toolmakers

Engis Equipment Co., 431 S. Dearborn St., Chicago 5, III. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

MILLING ATTACHMENTS

Brown & Sharpe Mfg. Co., Providence, R. I. Cincinnati Milling Machine Co., Cincinnati, Consolidated Machine Tool Corp., Rochester, N. Y.
Gorton, George Mch. Co., 1110 W. 13th St., Racine, Wis.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, III.
Kearney & Trecker Corp., Milwaukee, Wis.
Kempsmith Machine Co., 1819 S. 71st St., Milwaukee 14, Wis.
Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio
Porter-Cable Machine Co, Salina St., Syracuse, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Reed-Prentice Corp., 677 Cambridge St., Worcester, Mass. Consolidated Machine Tool Corp., Rochester,

cester, Mass. Rivett Lathe & Grinder, Inc., Brighton, Boston

Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

Van Keuren Co., 176 Waltham St., Watertown, Boston, Mass. Van Norman Co., 3640 Main St., Springfield 7.

MILLING AND CENTERING MACHINES

Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis. Jones & Lamson Mch. Co. (Automatic), 160 Clinton St., Springfield, Vt. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

MILLING MACHINES, Automotic

Cincinnati Milling Machine Co., Cincinnati, Consolidated Machine Tool Corp., Rochester, N. Y. (Continued on page 344)



MEYCO CARBIDE INSERTED DRILL JIG BUSHINGS

PATENTED

There are three simple reasons why MEYCO Carbide Inserted Bushings have won an enviable reputation for themselves:

- 1. Cemented tungsten carbide inserts at the points of wear increase the life of the bushings an unbelievably long time.
- 2. Hardened steel rings above and below the carbide inserts protect both drill and carbide from the shock of impact.
- 3. Body of hardened special alloy steel, combines the best features of steel bushings with the best features of carbide.

The story is simple: MEYCO bushings last as long as solid carbide bushings in most cases at costs that come close to the prices of ordinary steel bushings. And on top of that-they will increase the life of drills and fixtures, maintain accuracy much longer and solve extra tough production drilling problems. Made to A.S.A. Standards. For full information write for catalog No. 30.

Manufacturers of precision tools since 1888



They cancelled their order and we liked it!

• NE of our good customers ordered a 1500 lb.
CECO-DROP, and shortly thereafter cancelled the order.

We don't like cancellations any better than anyone else, but this one we did like . . . after we learned the reason for it: In re-assessing their forge shop requirements, they decided they needed, not one 1500 lb., but $\underline{two} \ \underline{3000} \ \text{lb}$. Ceco-Drops, with an eventual goal of a $100\% \ \overline{\text{Ceco-Drop}}$ Shop.

QUOTATION:

The trend is definitely toward Ceco-Drops

35

vhy

s at

ind

eel,

sh-

in the

on

roto "I would give a good deal if I had all of our board drop hammers out of the shop and nothing but Ceco-Drops in."

Write for a copy of Bulletin 11-L-O and learn more about this modern hammer.

CHAMBERSBURG ENGINEERING COMPANY
Chambersburg Pennsylvania

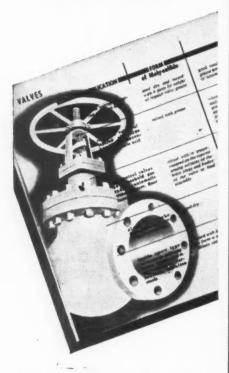


CHAMBERSBURG

THE HAMMER BUILDERS

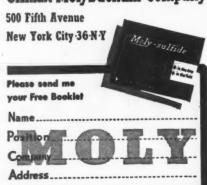
Moly-sulfide

is proving effective even where other lubricants have failed



Moly-sulfide, a solid-film lubricant, is proving so useful in difficult friction applications that new uses are found daily. 154 cases of how serious problems were solved are described in our new booklet. Your own problems may be like those described. Write for your copy of this booklet.

Climax Molybdenum Company



Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y. Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, III. Jones & Lamson Mch. Co., 160 Clinton St., Springfield, Vt. Kearney & Trecker Corp., Milwaukee, Wis. Rockford, III. Pratt & Whitney, West Hartford 1, Conn. Snyder Tool & Engineering Co., 3400 East Lafayette, Detroit 7, Mich. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III. U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

MILLING MACHINES, Bench

Atlas Press Co., 1253 N. Pitcher St., Kalama-Target & Whitney, West Hartford 1, Conn.

MILLING MACHINES, Circular Continuous

Consolidated Machine Tool Corp., Rochester, Constituted Machine 1661 Corp., Rochester, N. Y., Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.
Espen-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa. Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, III.
Kearney & Trecker Corp., Milwaukee, Wis. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

MILLING MACHINES, Duplex

Cincinnati Milling Machine Co., Cincinnati, Ohio. Consolidated Machine Tool Corp., Rochester, N. Y.
Espen-Lucas Mch. Works, Front St. and Girard
Ave., Philadelphia, Pa.
Ingersoll Milling Mch. Co., 2442 Douglas St.,
Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Sundstrand Mch. Tool Co., 2531 11th St.,
Rockford, Ill.
U. S. Tool Co., Inc., 255 North 18th St.,
Ampere, N. J.

MILLING MACHINES, Hand

Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.
Nichols-Morris Corp., 50 Church St., New York, N. Y.
U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.
Van Norman Co., 3640 Main St., Springfield 7, Mass.

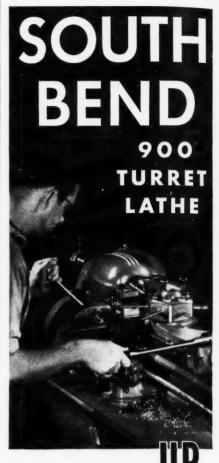
MILLING MACHINES, Horizontal, Plain and Universal

Austin Industrial Corp., 76 Mamaroneck Ave., White Plains, N. Y. Brown & Sharpe Mfg. Co., Providence, R. I. Cincinnati Milling Machine Co., Cincinnati, Ohio.
Consolidated Machine Tool Corp., Rochester, N. Y. 405 Levinster Consolidated Machine Tool Corp., Rochester, N. Y.
Cosa Corp., 405 Lexington Ave., New York 17, N. Y.
Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.
Greaves Mch. Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, III.
Kearney & Trecker Corp., Milwaukee, Wis.
Kempsmith Machine Co., 1819 S. 71st St., Milwaukee 14, Wis.
Marac Mchry. Corp., 1819 Broadway, New York, N. Y.
Neise, Karl A., Dept. M., 381 Fourth Ave., New York 16, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Sheldon Machine Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, III.
Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.
Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.
Van Norman Co., 3640 Main St., Springfield 7, Mass.

MILLING MACHINES, Lincoln Type

Brown & Sharpe Mfg. Co., Providence, R. I. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

(Continued on page 346)



KFFPS PRODUCT AND COSTS N

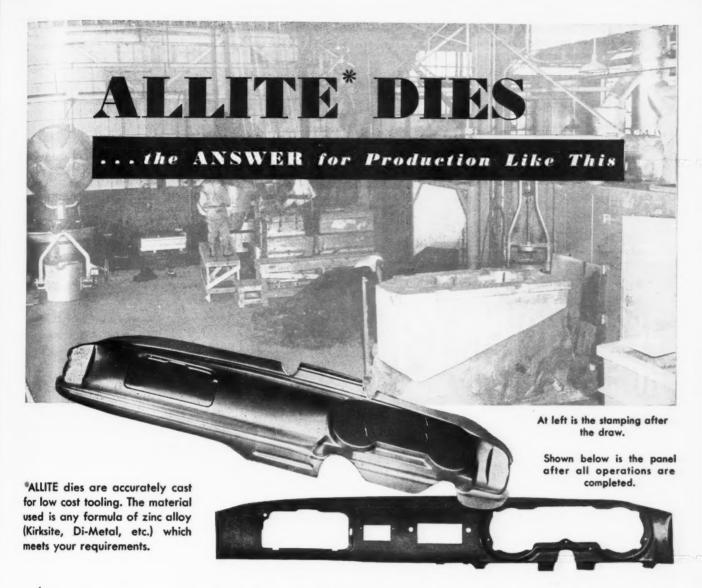
Here's a precision turret lathe that will help you increase production and reduce costs on precision parts. High output comes easy on the Series 900 South Bend Turret Lathe. It's quick and easy to operate. A wide range of speeds and power carriage feeds contribute to efficient machining. Close tolerances can be held without sacrificing speed. These features make the Series 900 Turret Lathe ideal for second operation work. If you are producing small precision parts, it will pay you to find out more about South Bend Turret Lathes which are made in three sizes: 1/2" to 1" collet capacity, 9" to 16" swing. Write for catalog on Engine Lathes, Toolroom Lathes, Drill Presses and Shapers.

SPECIFICATIONS

Collet Capacity: ½". Spindle Bore: ¾". Swing: 9¼" over bed, 3¾6" over double tool cross slide, 5½" over compound cross slide. Turret to Spindle Distance: 20 1/8". Twelve Spindle Speeds: 41 to 1270 r.p.m. 48 Power Longitudinal Feeds. 48 Power Cross-Beds. 48 Thread Cutting Pitches R.H. or L.H. 4 to 224 per inch.



SOUTH BEND LATHE **Building Better Tools Since 1906** SOUTH BEND 22, INDIANA



Allite Dies were used as the tooling for this right-hand instrument panel. These were the results:

- The tooling costs were less than half that which would have been required for iron dies.
- The customer reports that more than 8000 stampings have been produced, with the original Allite draw die still in serviceable condition. This die is 100% zinc alloy.

This is typical of many Allite Die applications where all the advantages of low cost tooling, faster production starts and accurately built tools have been combined. And that has only been made possible by the close coordination of foundry and die shop facilities which only Allied can offer.

Allite Dies can be the answer to your experimental or short run production die problems, too. Why not write today for the complete story.

Other

ALLIED PRODUCTS

HARDENED AND PRECISION GROUND
PARTS • SPECIAL COLD FORGED
PARTS • STANDARD CAP SCREWS
• SHEET METAL DIES FROM THE
LARGEST TO THE SMALLEST • JIGS •
FIXTURES • R-B INTERCHANGEABLE
PUNCHES AND DIES

ALLIED PRODUCTS CORPORATION

DEPT. D-8

12619 BURT ROAD

DETROIT 23 MICH



PLANT 1 Detroit, Mich.

nd gh

00

ck

of

n-

se

i-

1e

co-

11

h

le

2-

or

m

g: ss to s:

A



PLANT 2 Detroit, Mich.



PLANT 3 Hillsdale, Mich.



PLANT 4 Hillsdale, Mich.

MILLING MACHINES, Planer Type

Consolidated Machine Tool Corp., Rochester, N. Y.

Espen-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa.

Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

Gray, G. A., Co., Woodburn Ave. and Penn.

R. R., Evanston, Cincinnati, Ohio.

Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.

Kearney & Trecker Corp., Milwaukee, Wis.

Pratt & Whitney, West Hartford 1, Conn.

MILLING MACHINES, Profile

Cincinnati Milling Machine Co., Cincinnati, Cosa Corp., 405 Lexington Ave., New York 17, N. Y. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Frew Machine Co., 121 East Luray St., Phila-delphia 20, Pa. Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis. Pratt & Whitney, West Hartford 1, Conn. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III.

MILLING MACHINES, Ram Type Universal

Van Norman Co., 3640 Main St., Springfield 7,

MILLING MACHINES, Turret Type

Bridgeport Machines, Inc., Linley Ave., Bridgeport, Conn.

MILLING MACHINES, Vertical

British Industries Corp., International Mchry.
Div., 164 Duane St., New York, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Cincinnati,
Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.

Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis.
Ingersoll Milling Mch. Co., 2442 Douglas St., Rockford, Ill.
Kearney & Trecker Corp., Milwaukee, Wis.
Marac Mchry. Co., 1819 Broadway, New York N. Y.
Neise, Karl A., Dept. M, 381 Fourth Ave., New York 16, N. Y.
Pratt & Whitney, West Hartford 1, Conn.
Reed-Prentice Corp., 677 Cambridge St., Worcester, Mass.
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.

MODEL AND EXPERIMENTAL WORK

See Special Machinery and Tools,

MOLD AND DIE COPYING MACHINES

Gorton, George, Mch. Co., 1110 W. 13th St., Racine, Wis. Pratt & Whitney, West Hartford 1, Conn.

MOLDING MACHINES, Plastic

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III. Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio. Reed-Prentice Corp., 677 Cambridge St., Worcester, Mass.
Rockford Machine Tool Co., 2500 Kishwaukee
St., Rockford, Ill.
Watson-Stillman Co., Aldene Rd., Roselle, N. J.

MOLYBDENUM

Climax Molybdenum Co., 500 5th Ave., New York, N. Y.

MOTORS, Electris

Delco Products Div., General Motors Corp., 321 E. First St., Dayton, Ohio. General Electric Co., Schenectady, N. Y. Reliance Elec. & Engrg. Co., Collinwood Sta., 1088 Ivanhoe Rd., Cleveland, Ohio.

MOTORS, Hydraulic

Gerotor May Corp., Oliver St. and Maryland Ave., Baltimore, Md. Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis. Sundstrand Machine Tool Co., 2531 11th St., Rockford, III.

MULTIPLE-SLIDE FORMING MACHINES

Nilson Machine Co., A. H., 1506 Railroad Ave., Bridgeport, Conn. U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

NIBBLING MACHINES

Campbell Machine Div., American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport, Conn. Wales-Strippit Corp., North Tonawanda, N. Y.

NIBBLING MACHINES, Nickel

International Nickel Co., Inc., 67 Wall St., New York, N. Y.

NIPPLE THREADING MACHINERY

Landis Machine Co., Inc., Waynesboro, Pa.

NUT MAKING MACHINERY

National Machinery Co., Greenfield and Stanton Sts., Tiffin, Ohio.

NUT SETTING EQUIPMENT

See Screw Driving and Nut Setting Equipment.

NUT TAPPERS

See Bolt and Nut Machinery.

NUTS, Cold Forged, Wing and Cap

Chicago Screw Co., Bellwood, Ill.
Parker-Kalon Corp., 200 Varick St., New York
14, N. Y.
Republic Steel Corp. (Union Drawn Steel Div.),
Republic Bldg., Cleveland 1, Ohio.
Union Drawn Steel Co. Div., Republic Steel
Corp., Massillon, Ohio.

(Continued on page 348)



On a Davis & Thompson 5 Station Machine

This type MDT FIVE STATION IN-DEXING DRILLER has five fixtures mounted on the index table. Each of these fixtures holds 2 RH and 2 LH automobile front suspension support arms. Four ROTO-MATIC Power Heads, each having four spindles, perform the following operations:

- 1. Drill 53/64" dia.—Half way through.
- 2. Drill .823" dia. Balance of way through.
- 3. End Cut Ream .8547/.8550" Full length of hole.
- 4. Finish Ream.8635/.8637"-Full length of hole.

5. Load and Unload.

Station Type Indexing Machine for drilling and reaming king pin holes.

Two RH and two LH pieces are completed at the end of each cycle. Cycling is automatic, and, operator loads and unloads during machine cycle.

4 New Davis & Thompson Mechanical Power Heads

Included in the design of this machine are the new ROTO-MATIC Mechanical Electrical Power Heads operated through screw feed. An important safety feature of these units is the patented overload release clutches on the feed. Because of the simplicity of their design the units require a minimum of servicing.

Free Data

Will be furnished on request.



Davis & Thompson Company 6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN



Only an absolutely rigid, chatter-free machine with built-in tracer device—not an attachment—can give you maximum output, accuracy and finish. For amazing speed in finishturning without rejects you can depend on the H.E.B. designed for automatic copy-turning from the base up!

rk

ES

e.,

4,

S

Costly down-time is eliminated with the H.E.B. Hydraulic Copying Lathe. Takes no more than 10 to 20 minutes for setting, and the finished parts are copy-turned up to 300% faster than on multi-tool lathes. Economical for short runs,

With its 20 H.P. motor the **OP Model** takes heavy cuts with carbide tools at spindle speeds 50 to 3600 RPM. **GT Models** with rotating pattern are designed for copying an infinite variety of irregular, non-circular work.

Over a thousand of these modern copying lathes are now in use throughout the world.... Designed and built in France by H. Ernault Batignolles, machine tool manufacturers for almost a hundred years!

See for yourself how fast this revolutionary machine can pay for itself. For complete information, or to arrange demonstration in New York, Detroit or Los Angeles showrooms, call your nearest H.E.B. representative now!

W. P. Childs Machinery P.O. Box 700 Cypress 5041

CHICAGO, ILL.
Four States Machinery Co.
5304 W. Chicago Avenue
Esterbrook 9-3200

SAN FRANCISCO, CALIF.
Marbur Machinery Co.
3637 Adeline Avenue
Emeryville
Piedmont 5-0855

INDIANAPOLIS, IND. G. A. Richey & Sons 644 East 38th Street Hickory 5314 LOS ANGELES, CALIF.

Dayton & Bakewell
1939 Santa Fe Avenue
Trinity 7466

NEW YORK CITY Triplex Machine Tool Corp. 75 West Street Hanover 2-4520

DETROIT, MICH.
Walter S. Ryan Co.
4363 Woodward Avenue
Royal Oak
Lincoln 1-1000

ST. PAUL, MINN.
Forcey Machine
Tool Sales
445 Endicott Building
Cedar 1600

SEATTLE, WASH.

Dawson Machinery Co. 5799 First Avenue So. Lander 8877

WORCESTER, MASS.

United Machinery & Tool Co. 84 Central Street Worcester 6-7171

CANADA: HAMILTON, ONT.

International Machinery Co. 73 Robert Street Hamilton 7-3679



DELIVERY FROM STOCK...
NO PRIORITY REQUIRED!

H.E.B. MACHINE TOOLS, INC.

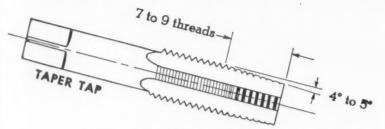
341 MADISON AVENUE, NEW YORK 17, N. Y. MURRAY HILL 9-7079

COPYING LATHES . ENGINE LATHES WITH COPYING ATTACHMENTS . TOOL ROOM LATHES . CARBIDE TOOL GRINDERS

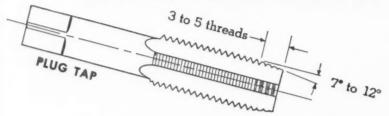
MACHINERY, August, 1952-347

USE THE RIGHT TAP

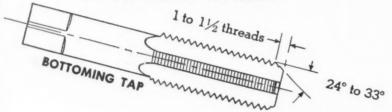
(HOW TO DO MORE TAPPING WITH FEWER TAPS)



TAPER POINT TAPS ARE FOR USE IN THROUGH HOLES. LONG CHAMFER HELPS STRAIGHT STARTING AND DISTRIBUTES CUTTING LOAD.



PLUG POINT TAPS ARE THE MOST COMMONLY USED FOR AVERAGE PRODUCTION. CAN BE USED IN TAPPING THROUGH HOLES OR IN BLIND HOLES IF ENOUGH CLEARANCE IS ALLOWED IN THE BOTTOMS OF THE HOLES.



BOTTOMING TAPS ARE FOR USE IN BLIND HOLES WHERE IT IS NECESSARY TO THREAD ALL THE WAY TO THE BOTTOM.

THREAD MORE HOLES WITH FEWER TAPS INSIST ON ...

HY-PRO





COMPANY

NEW BEDFORD, MASS., U.S.A.

NUTS, Self-Locking

Grip Nut Co., 310 S. Michigan Ave., Chicago 4,

NUTS, Thumb or Wing and Cap

Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio. Republic Steel Corp., Bolt and Nut Div., Re-public Bldg., Cleveland 1, Ohio. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

OIL CUPS

Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave., Chicago, III.

OIL EXTRACTORS AND CLEANERS

Barnes Drill Co. (Magnetic), 814 Chest**nut**, Rockford, III. De Laval Separator Co., Poughkeepsie, N. Y.

OIL GROOVERS

Wicaco Machine Co., Stenton Ave. and Louden St., Philadelphia, Pa.

OIL HOLE COVERS

Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave., Chicago, III.

OIL SEALS

Crone Packing Co., 1800 Cuyler Ave., Chicago, Garlock Packing Co., Palmyra, N. Y.

OILERS AND LUBRICATORS

Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave., Chicago, III. Madison-Kipp Corp., Madison, Wis.

Sm

Me

Lar

(St

OILS, Cutting

See Cutting and Grinding Fluids.

OILS, Lubricating

Cities Service Oil Co., 70 Pine St., New York, N. Y.
DoAll Co., 254 Laurel Ave., Des Plaines, III.
Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.
Houghton & Co., E. F., 303 W. Lehigh Ave.,
Philadelphia, Pa.
Pure Oil Co., 35 E. Wacker Drive, Chicago, III.
Shell Oil Co., 50 West 50th St., New York,
N. Y. N. Y. Sinclair Refining Co., 630 5th Ave., New York, N. Y. Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, III. Stuart Oil Co., Ltd., D. A., 2739 S. Troy St., Chicago 23, III. Sun Oil Co., 1608 Walnut St., Philadelphia, Pa. Texas Co., 135 E. 42nd St., New York, N. Y. Tide Water Associated Oil Co., 17 Battery Place, New York, N. Y.

OILS, Quenching and Tempering

Olls, Quenching and Tempering
Cities Service Oil Co., 70 Pine St., New York, N. Y.
Gulf Oil Corp., Gulf Bldg., Pittsburgh 30, Pa.
Houghton & Co., E. F., 303 W. Lehigh Ave.,
Philadelphia, Pa.
Shell Oil Co., 50 West 50th St., New York, N. Y.
Sinclair Refining Co., 630 5th Ave., New York, N.-Y.
Standard Oil Co. (Indiana), 910 S. Michigan,
Chicago, Ill.
Stuart, D. A., Oil Co., Ltd., 2739 S. Troy St.,
Chicago 23, Ill.

OILS, Soluble

See Compounds, Cutting, Grinding, Metal Drawing, Etc.

ORDNANCE MACHINES, Special

Rehnberg-Jacobson Mfg. Co., 2135 Kishwaukee St., Rockford, III.

PACKING, Leather, Metal, Rubber, Asbestos, Etc.

Garlock Packing Co., Palmyra, N. Y. Houghton & Co., E. F., 303 W. Lehigh Ave., Philadelphia, Pa.

(Continued on page 350)

HYDRATROL LATHES

LARGE HOLLOW SPINDLE TYPE

Check These 3 Points of ...

Jersatility





3 Also built with beds and carriages on each end of headstock for machining both ends of a shaft at one time.

Both Illustrations Show the 18" Hollow Spindle 7%" Hole

e.,

ut,

len

e.,

rk,

it.,

e., ·k,

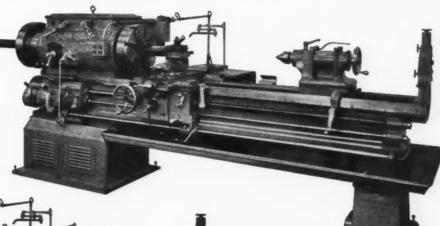
n,

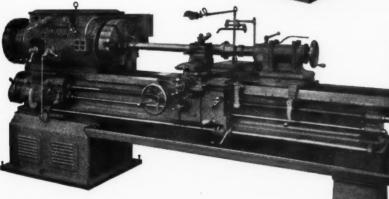
SIZES 18" TO 36"

Small — 18" & 20" up to 7%" Hole

Medium — 25" up to 12" Hole Large — 32" & 36" up to 16\%"

(Standard Type Lathes 16"-36")





For Faster Production,

Better Work, Lower Costs!

IMPORTANT FEATURES

Timken Bearing Spindles.

Hydraulic clutches for forward and reverse, controlled from apron or headstock.

Hydraulic brake for close position control.

Hydraulic clutches self-compensating. No adjustment and full power capacity at all times.

LEHMANN MACHINE COMPANY

CHOUTEAU AT GRAND . SAINT LOUIS 3, MISSOURI

PARALLELS

Brown & Sharpe Mfg. Co., Providence, R. I. Rahn Granite Surface Plate Co., 637 No. West-ern Ave., Dayton, Ohio. Starrett, The L. S., Co., Athol, Mass. Taft-Peirce Mfg. Co., Woonsocket, R. I. Walker, O. S., Co., Inc., Worcester, Mass.

PATTERNS, Wood and Metal

Mummert-Dixon Co., Hanover, Pa.

PHOSPHOR BRONZE—See Bronze.

PILLOW BLOCKS

Boston Gear Works, Inc., North Quincy 71, Mass. Norma-Hoffmann Bearings Corp., Stamford, Corn., Stamford, Corn., Stamford, Corn., Shafer Bearing Corp., Downers Grove, III. S K F Industries, Inc., P. O. Box 6731, North Philadelphia, Pa. Standard Pressed Steel Co., Jenkintown, Pa.

PIPE, BRASS AND COPPER

American Brass Co., 25 Broadway, New York, N. Y. Chase Brass & Copper Co., Inc., 1949 Rodney St., Waterbury 20, Conn. Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

PIPE STEEL

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Republic Steel Corp., Republic Bldg., Cleveland
1, Ohio.
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th
St., Chicago 18, Ill.
United States Steel Corp., National Tube Co.
Div., 436 7th Ave., Pittsburgh, Pa.

PIPE THREADING AND CUTTING MACHINES

Landis Machine Co., Inc., Waynesboro, Pa.

PIPE TONGS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

PLANER ATTACHMENTS

Consolidated Mch. Tool Corp., Rochester, N. Y. Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

Gray, G. A., Co., Woodburn Ave. and Penn. R. R., Evanston, Cincinnati, Ohio.

Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.

Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, III.

PLANERS, Double Housing and Openside

Baldwin-Lima-Hamilton Corp., Philadelphia 42,

Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio (Plate), Consolidated Mch. Tool Corp. (Incl. Plate, Rotary and Crank Types), Rochester, N. Y. Giddings & Lewis Machine Tool Co., Fond du

Giddings & Wis.

Gray, G. A., Co., Woodburn Ave. and Penn. R. R., Evanston, Cincinnati, Ohio.

Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, III.

PLASTIC AND PLASTIC PRODUCTS

Bakelite Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

PLATE ROLLS

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio. Bethlehem Steel Co., Bethlehem, Pa. Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio. Consolidated Mch. Tool Corp., Rochester, N. Y. Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.

Williams, White & Co., Moline, III.

PLATES, Angle

Rahn Granite Surface Plate Co., 637 N. Western Ave., Dayton, Ohio.

PLATES, Surface

Brown & Sharpe Mfg. Co., Providence, R. I. Challenge Machinery Co., Grand Haven, Mich.
Delta Power Tool Div., Rockwell Mfg. Co.,
614 G N. Lexington Ave., Pittsburgh 8, Pa.
Pratt & Whitney Div., West Hartford 1, Conn. Rahn Granite Surface Plate Co., 637 N. Western Ave., Dayton, Ohio.

Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

Tatt-Peirce Mfg. Co., Woonsocket, R. I. U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

Vinco Corp., 8855 Schaefer Highway, Detroit 27, Mich.

PNEUMATIC EQUIPMENT

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.

Hanna Engineering Works, 1752 Elston Ave., Chicago, III.

Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,

Ingersoll-Rand Co., Phillipsburg, N. J. Mead Specialties Co., 4114 North Knox Ave., Chicago 41, III.

Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, III.

POLISHING LATHES AND MACHINES

Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md. Gardner Machine Co. (Div. Landis Tool Co.), 414 E. Gardner St., Beloit, Wis.

(Continued on page 352)

OILAG goes down

with this Procunier High Speed Tap Head

Today you must speed up your production schedules . . . and at the same time reduce spoilage! The Procunier High Speed Tapping Head is precision-built for faster, consistently accurate production tapping. A host of exclusive Procunier features enable you to maintain cleaner, sharper threads . . . with fewer broken taps, fewer spoiled pieces-even on accelerated pro-

duction runs.

HERE'S WHY: Tap driving pressure is automatically regulated by the amount of pressure applied to the unique Procunier friction clutch. Operators quickly learn to detect dull or "loaded" taps just by the pressure needed to drive them! This increased sensitivity enables even "green" operators to do more accurate tapping.
"Blind" hole tapping may be done as easily as through tapping! WRITE TODAY for brochure giving fu'l details and specifications on Procunier High Speed Tap Heads. Also Available-

NEW! Procunier "TAP KING" for large hole tapping. Capacity 3/8" to 1" in steel; 11/8" in softer metals.

rocunier

Safety Chuck Company 16 S. CLINTON ST. CHICAGO 6, ILL.

Exclusive! **PROCUNIER** "Tap Saver" The exclusive Pro-cunier "Tru - Grip" tap holder is lighter, smaller in diameter. It affords easier tap-ping close to walls or shoulders, elim-inates "chewed" tap shanks. Holds tap true.

Prompt **Delivery!** PROCUNIER SAFETY CHUCK CO. 16 S. Clinton St., Chicago 6, III. Dept. 8 Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

Address.....State....





WHEN YOU PICK A

PORTABLE POVVER TOOL

several factors are important: the weight of the tool ... speed under load ... balance ... ease of handling ... power requirements ... cost of maintenance.

But most important of all is the work productivity of the tool.

CP SUPER CYCLE ELECTRIC TOOLS have 10%

to 20% greater productivity than any other type of portable power tool.

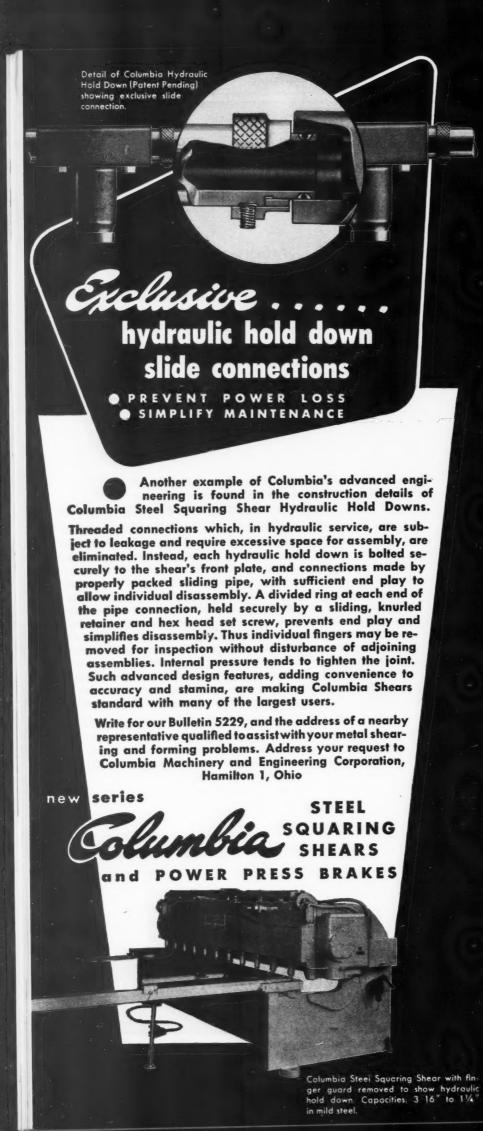
If you use, or can use, six or more portable tools in one location, we shall be glad to arrange for a demonstration of the advantages of SUPER CYCLE TOOLS under your own operating conditions.

Write for Catalog 905-2





PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.

Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y.

Millers Falls Co., Greenfield, Mass.

Sundstrand Machine Tool Co., 2531 11th St., Rockford, III.

POLISHING TOOLS, Portable

Jarvis, Charles L., Co., Middletown, Conn. Sundstrand Machine Tool Co., 2531 11th St., Rockford, III.

POWER UNITS, Hydraulic

See Hydraulic Power Units or Tool Heads.

PRESSES, Arbor

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.

Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Farquhar Co., A. B., 21 Duke St., York, Pa. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,

Hirschmann, Corl, Co., 30 Park Ave., Man-hasset, N. Y.

Tomkins-Johnson Co., 614 No. Mechanic St., Jackson, Mich.

Watson-Stillman Co., Aldene Rd., Roselle, N. J. Wilson, K. R., 215 Main St., Buffalo, N. Y.

PRESSES, Broaching

American Broach & Mch. Co., Ann Arbor, Mich. Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.

Colonial Broach Co., Detroit 13, Mich. Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Farquhar Co., A. B., 21 Duke St., York, Pa.

Ferrocute Machine Co., Bridgeton, N. J. Lake Erie Engrg. Co., Kenmore Station, Buffalo, N. Y.

Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.

Oilgear Co., 1560 W. Pierce St., Milwaukee 4,

Watson-Stillman Co., Aldene Rd., Roselle, N. J.

PRESSES, Extrusion

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio,

Chambersburg Engrg. Co., Chambersburg, Pa. Farquhar Co., A. B., 21 Duke St., York, Pa. Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.

Hydropress, Inc., 350 Fifth Ave., New York 1,

Lake Erie Engrg. Co., Kenmore Station, Buffalo, N. Y. Watson-Stillman Co., Aldene Rd., Roselle, N. J.

PRESSES, Foot

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton,

Ferragute Machine Co., Bridgeton, N. J. Niagara Machine & Tool Works, 683 North-land Ave., Buffalo, N. Y.

V & O Press Co., Div. Emhart Mfg. Co., Hudson, N. Y.

PRESSES, Forging

Ajax Mfg. Co., Euclid, Cleveland 17, Ohio. American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

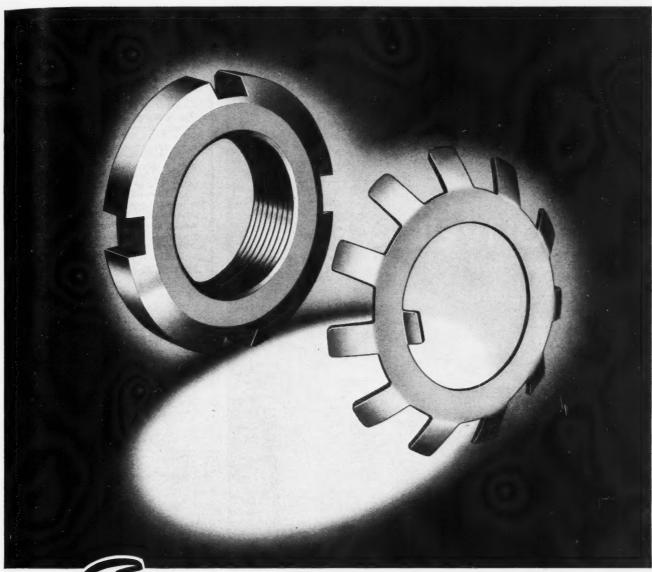
Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.

Bethlehem Steel Co., Bethlehem, Pa.

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.

Clearing Machine Corp., 6499 W. 65th St., Chicago 38, III. Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.

(Continued on page 354)



Standard

St.,

St.,

St.,

Locknuts and Lockwashers are your assurance of rugged strength but smooth bearing assembly action. Precise, solid locking permits accurate shaft adjustment and gives you long-life performance. The skilled craftsmanship that produces Standard Locknuts and Lockwashers is available for the manufacture of special locknut and lockwasher items for any application. Your requests for quotations receive prompt attention and all orders receive Standard's prompt shipping service. Order today—Specify STANDARD!

Write for STANDARD'S detailed Bulletin No. 29 today!



STANDARD

Locknut and Lockwasher, Inc. 510 NORTH CAPITOL AVE. . INDIANAPOLIS 4, INDIANA

MACHINERY, August, 1952-353

FAMED for PRECISIO



U. S. Coast Guard Cutters Have Won International Fame For Their Precision Charting of Icebergs

For centuries icebergs have presented a serious threat to North Atlantic shipping. Following the tragic loss of

the S.S. Titanic in 1912, the U.S. Coast Guard took over the Iceberg Patrol. Their ceaseless, precise charting and tracking has prevented icebergs from sinking any passenger ships since that date - 40 vears ago.

OLIVER ACE

Universal Tool and Cutter Grinders

Famed for Precision Give

Guaranteed Accuracy

Toolroom operators find it a pleasure to grind cutters of all types—quickly and easily -with the Oliver Ace. Really excelling on high speed and Tungsten-Carbide work, the Oliver Ace is faster on most < grinding operations. The setup is simple—the operation easy. The ACE requires no computation, yet handles a wide range of cutter grinding. Direct reading for clearances reduces fatique—eases operators' jobs—(no stoop . . . no squat . . . no squint).



You'll easily keep your most

difficult cutters sharp when you equip with a proved, dependable Oliver Ace Universal Tool and Cutter Grinder . . . soundly engineered . . . so efficient and so economical to operate.

Priced to meet your budget, the ACE excels for grinding face mills up to 15" - also, slab mills . slitting saws . dovetail cutters · angular cutters · double angle cutters · Fellows helical cutters · reamers · taper reamers · production gashing.

2 MODELS: Standard and Heavy Duty (illustrated).

INSTRUMENT CO.

1410 E. MAUMEE . ADRIAN, MICHIGAN GOINDEN-DIMERING WAC-HIS

AUTOMATIC DEILI GRINDICI TOOK & CUTTER GRINDING - DOILL POINT THINNERS - TEMPLATE TOOL GOINDIG! - FACE MILL

Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Farquhar Co., A. B., 21 Duke St., York, Pa. Ferracute Machine Co., Bridgeton, N. J.

Henry & Wright Div., Emhart Mfg. Co., 760 Windsor St., Hartford 1, Conn.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.

Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.

Morgan Engrg. Co., Alliance, Ohio.

National Mchry. Co., Greenfield and Stanton Sts., Tiffin, Ohio.

Niagara Machine & Tool Works, 683 North-land Ave., Buffalo, N. Y.

V & O Press Co., Div. Emhart Mfg. Co., Hudson, N. Y. Verson Allsteel Press Co., 93rd St. and S. Ken-wood Ave., Chicago, III. Watson-Stillman Co., Aldene Rd., Roselle, N. J. Williams-White & Co., Moline, III.

Wilson, K. R., 215 Main St., Buffalo, N. Y. Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J.

PRESSES. Hydraulic

American Broach & Mch. Co., Ann Arbor, Mich. American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, III.

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.

Bethlehem Steel Co., Bethlehem, Pa.

Birdsboro Steel Fdry, & Mch. Co., Birdsboro, Pg. Bliss Co., E. W., 1375 Raff Rd., S. W., Canton,

Chambersburg Engrg. Co., Chambersburg, Pa. Clearing Machine Corp., 6499 W. 65th St., Chicago 38, III.

Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit, Mich.

Columbia Mchry. & Engrg. Co., Hamilton 1, Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Haven, Mich.

Denison Engrg. Co., 1160 Dublin St., Columbus 16, Ohio.

Farquhar Co., A. B., 21 Duke St., York, Pa. Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.

Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio. Hydropress, Inc., 350 Fifth Ave., New York I, N. Y.

Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.

Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.

Morgan Engrg. Co., Alliance, Ohio.

Niagara Machine & Tool Works, 683 North-land Ave., Buffalo, N. Y. Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.

Wis.
Verson Allsteel Press Co., 93rd St. and S. Kenwood Ave., Chicago, III.
Watson-Stillman Co., Aldene Rd., Roselle, N. J.
Williams-White & Co., Moline, III.
Wilson, K. R., 215 Main St., Buffalo, N. Y.

PRESSES, Pneumatic

Mead Specialties Co., 4114 North Knox Ave., Chicago 41, III.

PRESSES, Screw

PRESSES, Screw

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.

Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Ferracute Machine Co., Bridgeton, N. J.

Niagara Machine & Tool Works, 683 Northland Ave., Buffalo, N. Y.

Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J.

PRESSES, Sheet Metal Working

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.

(Continued on page 356)

How \$25. and a DAKE Press

saved \$1,200 worth of bushings from going to the scrap heap!

Buf-

nton

N. J.

St.,

St., iton

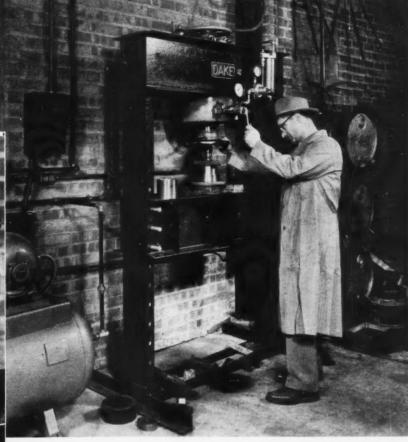
Sta.,

and bus St., ago,

rth-

. J.





Close-up shows bushing being pressed through shrinking die

hrough a purchasing error, a manufacturer ordered 286 cylindrical bronze bushings .002" oversize-both inside and outside diameter. Since each bushing cost about \$4.50, it would have meant a loss of more than \$1,200 to scrap them.

So the manufacturer called in a machinist who works wonders with his Dake Hydraulic Press. Together, they figured that by building a tapered die and pressing the bushings through, it might be possible to shrink the bushings the necessary .002" both I. D. and O. D.

The die was made, and the pressing job was so successful that all but two or three of the bushings were salvaged. The die required about four hours to make, and pressing time was another four hours. Total cost of the job-eight hours labor and a small amount for material—less than \$25.

The accurate operation of Dake Hydraulic Presses recommends them for scores of production, maintenance, and salvage operations. Do you have this versatile equipment?... are you using it to best advantage? . . . see your Dake distributor.



Write for this Catalog

Dake Engine Company, 604 Seventh St., Grand Haven, Mich.



















Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio.

Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, Ohio.

Chambersburg Engrg. Co., Chambersburg, Pa. Cincinnati Shaper Co., Elam and Garrard Ave., Cincinnati, Ohio.

Clarinati, Ohio.

Clearing Machine Corp., 6499 W. 65th St., Chicago 38, III.

Cleveland Crane & Engrg. Co., Wickliffe, Ohio.

Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.

Columbia Machinery & Engineering Corp., Hamilton 1, Ohio.

Consolidated Mch. Tool Corp., Rochester, N. Y. Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Danly Machine Specialties, Inc., 2107 S. 52nd Ave., Chicago 50, III.

Dreis & Krump Mfg. Co., 7416 Loomis Blvd., Chicago 36, III.

Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa. Farquhar Co., A. B., 21 Duke St., York, Pa. Ferracute Machine Co., Bridgeton, N. J.

Henry & Wright Div., Emhart Mfg. Co., 760 Windsor St., Hartford 1, Conn.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio. Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

Johnson Mch. & Press Corp., 620 W. Indiana Ave., Elkhart, Ind.

Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.

L & J Press Corp., Elkhart, Ind.

Minster Machine Co., Minster, Ohio.
Niagara Machine & Tool Works, 683 North-land Ave., Buffalo, N. Y.

Sales Service Mch. Tool Co., 2363 University Ave., St. Paul, Minn.

Verson Allsteel Press Co., 93rd St. and S. Ken-wood Ave., Chicago, III.

V & O Press Co., Div. Emhart Mfg. Co., Hudson, N. Y.

Wales-Strippit Corp., North Tonawanda, N. Y. Watson-Stillman Co., Aldene Rd., Roselle, N. J. Wilson, K. R., 215 Main St., Buffalo, N. Y. Zeh & Hahnemann Co., 182 Vanderpool St., Newark, N. J.

PRESSES, Straightening

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, III.

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Hamilton, Ohio.

Chambersburg Engrg. Co., Chambersburg, Pa. Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit, Mich.

Consolidated Mch. Tool Corp., Rochester, N. Y. Dake Engine Co., 604 Seventh St., Grand Haven, Mich.

Farquhar Co., A. B., 21 Duke St., York, Pa. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,

Hufford Machine Works, Inc., 1700 E. Grand Ave., El Segundo, Calif.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.

Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

Morgan Engrg. Co., Alliance, Ohio.
Niagara Mch. & Tool Works (Hydraulic), 683
Northland Ave., Buffalo, N. Y.
Oilgear Co., 1560 W. Pierce St., Milwaukee 4,
Wis.

Springfield Mch. Tool Co., Springfield, Ohio. Watson-Stillman Co., Aldene Rd., Roselle, N. J. Williams- White & Co., Moline, III. Wilson, K. R., 215 Main St., Buffalo, N. Y.

PROFILING MACHINES

Consolidated Mch. Tool Corp., Rochester, N. Y. Cosa Corp., 405 Lexington Ave., New York 17, N. Y.

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.

Gorton, George, Machine Co., 1110 W. 13th St., Racine, Wis.

Morey Mchry. Co., Inc. (and Affiliated com-panies), 410 Broome St., New York, N. Y. Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, III.

Pratt & Whitney, West Hartford 1, Conn. Sheffield Corp., 721 Springfield, Dayton, Ohio.

PULLEYS

Boston Gear Works, Inc., North Quincy 71, Mass.

PULLEYS, Friction Clutch

Brown & Sharpe Mfg. Co., Providence, R. I.

PUMPS, Coolant, Lubricant and Oil

Bowser, Inc., 1365 E. Creighton Ave., Fort Wayne, Ind.

Brown & Sharpe Mfg. Co., Providence, R. I. Delta Power Tool Div., Rockwell Mfg. Co., 620 E. Vienna Ave., Milwaukee, Wis.

Ingersoll-Rand Co., Phillipsburg, N. J. Pioneer Pump & Mfg. Co., 19679 John R St., Detroit, Mich.

Ruthman Machinery Co., 1809 Reading Rd., Cincinnati 12, Ohio.

Tomkins-Johnson Co., Jackson, Mich. Tuthill Pump Co., 939 E. 95th St., Chicago 19, III.

Viking Pump Co., Cedar Falls, Iowa.

PUMPS, Hydraulic

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

Baldwin-Lima-Hamilton Corp., Philadelphia 42,

Barnes, John S., Corp., Rockford, III. Bethlehem Steel Co., Bethlehem, Pa. Brown & Sharpe Mfg. Co., Providence, R. I. Chambersburg Engrg. Co., Chambersburg, Pa. Denison Engrg. Co., 1160 Dublin St., Columbus 16, Ohio.

Gerotor May Corp., Oliver St. and Maryland Ave., Baltimore, Md.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.

Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y. Ingersoll-Rand Co., Phillipsburg, N. J.

Lapointe Machine Tool Co., 34 Tower St., Hudson, Mass.

Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis. Sundstrand Machine Tool Co., 2531 11th St., Rockford, III.

Tuthill Pump Co., 939 E. 95th St., Chicago 19,

Viking Pump Co., Cedar Falls, Iowa.

PUMPS, Pneumatic

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Ingersoll-Rand Co., Phillipsburg, N. J.

PUMPS, Rotary

Bowser, Inc., 1365 E. Creighton Ave., Fort Wayne, Ind.

Brown & Sharpe Mfg. Co., Providence, R. I. Pioneer Pump & Mfg. Co., 19679 John R St., Detroit, Mich.

Sundstrand Machine Tool Co., 2531 11th St., Rockford, III.

Tuthill Pump Co., 939 E. 95th St., Chicago 19,

Viking Pump Co., Cedar Falls, Iowa.

PUMPS, Vacuum

Leiman, Inc., 156 Christie St., Newark, N. J.

PUNCHES AND DIES

See Dies, Sheet Metal, Etc.

PUNCHES, Centering

Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.

PUNCHING MACHINERY

Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio.

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.

Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.

Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.

Columbia Machinery & Engineering Corp., Hamilton 1, Ohio. Consolidated Mch. Tool Corp., Rochester, N. Y. Ferracute Machine Co., Bridgeton, N. J.

Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,

Kling Bros., Engineering Works, 1320 No. Kostner Ave., Chicago 51, III. Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.

O'Neill-Irwin Mfg. Co., Lake City, Minn. Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.

Wales-Strippit Corp., North Tonawanda, N. Y. Watson-Stillman Co., Aldene Rd., Roselle, N. J. Wiedemann Machine Co., 4272 Wissahickon Ave., Philadelphia, Pa.

Williams-White & Co., Moline, III.

PYROMETERS

Bristol Co., Platts Mills, Waterbury, Conn.

RACKS, Gear Cut

Atlantic Gear Works, Inc., 200 Lafayette St., New York 12, N. Y.

Boston Gear Works, Inc., North Quincy 71, Mass.

Brown & Sharpe Mfg. Co., Providence, R. I. ear Specialties, Inc., 2635 W. Medill Ave., Chicago 47, III.

75

to

th

th

m

ut

10

pr

in

th

(a

G

di

Si

cr

tu

h

01

m

Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn. Massachusetts Gear & Tool Co., 36 Nassau St., Woburn, Mass.

Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio.

Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa.

Stahl Gear & Mch. Co., 3901 Hamilton Ave., Cleveland 14, Ohio.

REAMER HOLDERS

Lipe-Rollway Corp., 806 Emerson Ave., Syracuse, N. Y. cuse, N. Warner & Swasey Co., 8701 Carnegie Ave., Cleveland 3, Ohio.

REAMERS

Atrax Co., Newington, Conn.

Barber-Colman Co., Rock and Montague, Rock-ford, III.

Butterfield Div., Union Twist Drill Co., Derby Line, Vt.

Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich. Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Firth Sterling Steel & Carbide Corp., McKeesport, Pa.

Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich. Greenfield Tap & Die Corp., Greenfield, Mass. Haynes Stellite Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.

Keo Cutters, 19326 Woodward, Detroit, Mich. Lipe-Rollway Corp., 806 Emerson Ave., Syracuse, N. Y.

Twist Drill & Mch. Co., New Bedford, Morse T Mass.

National Twist Drill & Tool Co., & Winter Bros. Co., Rochester, Mich.

Pratt & Whitney, West Hartford 1, Conn. Standard Tool Co., 3950 Chester Ave., Cleve-

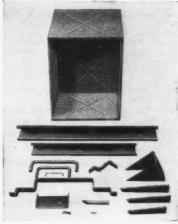
land, Ohio. Super Tool Co., 21650 Hoover Rd., Detroit 13,

Union Twist Drill Co., Athol, Mass.

Willey's Carbide Tool Co., 1340 W. Vernor Hwy., Detroit 1, Mich.

(Continued on page 358)

KRW PRESS BOUGHT FOR ONE JOB NOW DOES 15!



Here's the line-up . . .

Gross Machinery Inc. of Buffalo, N. Y., makers of dry cleaning equipment, forms all these parts on their KRW Hydraulic press. Each one used to be a slow, inaccurate hand or power brake job.

Gross Machinery originally bought this 75 ton KRW motor driven hydraulic press to form cylinder ribs of 14 gauge steel for their dry cleaning tumblers (second and third from top in photo above). Formerly made by hand, each rib required 12 minutes to form. Now the press does the same job in 1½ minutes.

falo,

7 St. Corp., N. Y. Cago,

land

16th

1. 1.

kon

St.,

ead

St.,

nd,

i G

e.,

by

17,

t.,

oit

5-

n,

But that was only the beginning. The press soon began poking its nose into every problem in the plant. It gave them a 50% increase in production of filter plates for their tumblers. The lint-collecting drawer (at top in photo above) used to rattle. Gross had almost decided to make these drawers out of heavier gauge, more expensive steel. But then they found that crisscross ribs formed by their KRW press eliminated the trouble. Brackets for the tumblers, corner inserts for the tumbler hoods, clips for holding wire and tubing on the tumbler - all these jobs are now made faster, more accurately on this versatile KRW press. Earl Westphal, general production superintendent at Gross, says: "We bought this press late in 1950 and it's paid for itself ten times over."



Bring your pressing problems to K. R. Wilson. We have a full line, 25 to 150 ton capacities, hand operated, air operated or motor driven presses. Write for facts, prices and delivery dates. Dept. 15.

K. R. WILSON

215 MAIN STREET

BUFFALO 3, NEW YORK

REAMERS, Adjustable

Barber-Colman Co., Rock and Montague, Rockford, III.

Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. Firth Sterling Steel & Carbide Corp., McKees-

orham Tool Co., 14400 Woodrow Wilson, Detroit, Mich. Gorham

Greenfield Tap & Die Corp., Greenfield, Mass. Madison Mfg. Co., Muskegon Heights, Mich. Morse Twist Drill & Mch. Co., New Bedford, Mass.

Pratt & Whitney, West Hartford 1, Conn. Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.

Taft-Peirce Mfg. Co., Woonsocket, R. I.
Union Twist Drill Co., Athol, Mass.
Wesson Co., 1220 Woodward Heights Blvd.,
Ferndale, Mich.

REAMERS, Taper Pin

Butterfield Div., Union Twist Drill Co., Derby Line, Vt.

Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.

Greenfield Tap & Die Corp., Greenfield, Mass. Kaufman Manufacturing Co., Manitowoc, Wis. Lipe-Rollway Corp., 806 Emerson Ave., Syracuse, N. Y. cuse, N. Y. Morse Twist Drill & Mch. Co., New Bedford,

National Twist Drill & Tool Co., & Winter Bros. Co., Rochester, Mich. Pratt & Whitney, West Hartford 1, Conn.

Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.

Union Twist Drill Co., Athol, Mass.

REAMING MACHINES

Greaves Machine Tool Co., 2009 Eastern Ave., Cincinnati, Ohio.

Kaufman Manufacturing Co., Manitowoc, Wis. Pratt & Whitney, West Hartford 1, Conn. Van Norman Co., 3640 Main St., Springfield 7,

RECORDING INSTRUMENTS for Counting

National Acme Co., 170 E. 131st St., Cleveland,

RECORDING INSTRUMENTS for Electricity

Bristol Co., Platts Mills, Waterbury, Conn. General Electric Co., Schenectady, N. Y.

RECORDING INSTRUMENTS for Pressure

Bristol Co., Platts Mills, Waterbury, Conn.

RECORDING INSTRUMENTS for Speed

Bristol Co., Platts Mills, Waterbury, Conn.

RECORDING INSTRUMENTS for Temperature

Bristol Co., Platts Mills, Waterbury, Conn.

REELS, Stock, Standard and Automatic

Nilson, A. H., Mch. Co., 1506 Railroad Ave., Bridgeport, Conn. U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

REFRACTORIES, Heat-Treating Furnace

Norton Co., 1 New Bond St., Worcester 6, Mass.

REGULATORS, Temperature

Bristol Co., Platts Mills, Waterbury, Conn. General Electric Co., Schenectady, N. Y.

REMOVERS, Japan, Enamel, Etc.

Oakite Products, Inc., 19 Rector St., New York, N. Y.

RETAINING RINGS FOR BEARINGS,

Nice Ball Bearing Co., Nicetown, Philadelphia, Pa. Waldes-Kohinoor, Inc., 4716 Austel Place, Long Island City 1, N. Y.

RHEOSTATS

Allen-Bradley Co., 1326 S. 2nd St., Milwaukee, General Electric Co., Schenectady, N. Y.

RIVET SETS

Bethlehem Steel Co., Bethlehem, Pa. Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio.

RIVETERS, Hydraulic

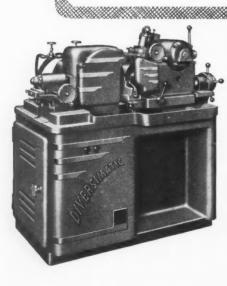
Bethlehem Steel Co., Bethlehem, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St.,
New York, N. Y.
Hanna Engineering Works, 1752 Elston Ave.,
Chicago, III.
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Morgan Engrg. Co., Alliance, Ohio.

RIVETERS, Pneumatic

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Grant Mfg. & Machine Co., 90 Silliman St., Bridgeport 5, Conn. Hanna Engineering Works, 1752 Elston Ave., Chicago III Chicago, III.
Ingersoli-Rand Co., Phillipsburg, N. J.
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th
St., Chicago 18, III.

(Continued on page 360)





special formed shapes, tapers, multi-diameters, etc.

THE DIVERSIMATIC CENTERLESS GRINDER

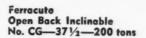
holds roundness, tolerance, concentricity on parts made of steel, nonferrous metals, plastics, carbides, rubber, porcelain, glass, brass, cast iron, etc. Produces the finish you need saves money in first cost!

Available with full line of accessories: Infeed, Thru-feed, Automatic Cycling.

Why wait? You can still get 8 weeks delivery! Write for full details and

Diversified Metal Products Company

5125 Alcog Avenue Los Angeles 58, California



Meet the Big Boy of the O. B. I.

Greatest efficiency and economy result when Open Back Inclinable presses are chosen accurately for specific jobs. For those production set-ups that demand SIZE, Ferracute tops off its very complete line of Inclinables with BIG BOY No. CG—37½—

- 200 tons rated capacity
- * Area of bed F to B \times R to L 34" \times 58"
- Stroke, maximum of 13"
- Cast steel frame
- Air-operated, electrically controlled friction clutch
- Automatic lubrication
- Slide counterbalanced with pneumatic cylinder
 - Bronze bushed journals and pitman
 - Flywheel and back shaft mounted on roller bearings

Write for complete descriptions and specifications

Ferracute Since 1863



MACHINE CO.

Power Presses Special Machinery BRIDGETON, NEW JERSEY, U.S.A.

RIVETING MACHINES

Buffalo Forge Co., 490 Broadway, Buffalo, N. Y.
General Riveters, Inc., 785 Hertel Ave.,
Buffalo 7, N. Y.
Grant Mfg. & Machine Co., 90 Silliman St.,
Bridgeport 5, Conn.
Hanna Engineering Works, 1752 Elston Ave.,
Chicago, Ill.
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,
Ill.
Tomking Johann C. III. Tomkins-Johnson Co., Jackson, Mich. Williams-White & Co., Moline, III.

RIVET MAKING MACHINES

Hill Acme Co., 1201 W. 65th St., Cleveland 2, National Machinery Co., Greenfield and Stanton Sts., Tiffin, Ohio.

RUBBER PRODUCTS

Garlock Packing Co., Palmyra, N. Y.

RULES, Steel

Brown & Sharpe Mfg. Co., Providence, R. I. Millers Falls Co., Greenfield, Mass. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y. Starrett, The L. S., Co., Athol, Mass.

RUST PREVENTIVES

Houghton, E. F., & Co., 303 W. Lehigh Ave., Philadelphia, Pa. Oakite Products, Inc., 19 Rector St., New York, N. Y. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

SAND BLAST EQUIPMENT

See Blast Cleaning Equipment.

SANDERS

Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Ingersoll-Rand Co., Phillipsburg, N. J.
Jarvis, Charles L., Co., Middletown, Conn. Millers Falls Co., Greenfield, Mass.
Porter-Cable Machine Co., Salina St., Syracuse, N. Y.
Skilsaw, Inc., 5033 N. Elston St., Chicago, Ill.
Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill.

SAW BLADES, Hock

Armstrong-Blum Mfg. Co., 5700 W. Blooming-dale Ave., Chicago, III.
DoAll Co., 254 Laurel Ave., Des Plaines, III.
Millers Falls Co., Greenfield, Mass.
Simonds Saw & Steel Co., 470 Main St., Fitch-burg, Mass.
Starrett, The L. S., Co., Athol, Mass.
Victor Saw Works, Inc., Middletown, N. Y.

SAW SHARPENING MACHINES

Earle Gear & Machine Co., 4707 Stenton Ave., Wayne Junction, Philadelphia 44, Pa. Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa. Motch & Merryweather Mchry. Co., Penton Bldg., Cleveland, Ohio. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

SAWING MACHINES, Circular

Consolidated Mch. Tool Corp., Rochester, N. Y. Cosa Corp., 405 Lexington Ave., New York 17, N. Y. N. Y. Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. DoAll Co., 254 Laurel Ave., Des Plaines, III. Earle Gear & Machine Co., 4707 Stenton Ave., Wayne Junction, Philadelphia 44, Pa. Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa. Motch & Merryweather Mchry. Co., Penton Bldg., Cleveland, Ohio.

SAWING MACHINES, Friction

DoAll Co., 254 Laurel Ave., Des Plaines, III. Kling Bros., Engineering Works, 1320 No. Kostner Ave., Chicago 51, III. Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.

SAWING MACHINES, Metal Cutting Band

Band

Armstrong-Blum Mfg. Co., 5700 W. Blooming-dale Ave., Chicago, III.

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. DoAll Co., 254 Laurel Ave., Des Plaines, III. Grob Bros., Grafton, Wis. Ryerson, Joseph T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.

Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

Tannewitz Works, 315 N. W. Front, Grand Rapids, Mich.

Walker-Turner Div., Kearney & Trecker Corp., South Ave., Plainfield, N. J.

SAWING MACHINES, Power Hack

Armstrong-Blum Mfg. Co., 5700 W. Blooming-dale Ave., Chicago, III.
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th
St., Chicago 18, III.
Victor Saw Works, Inc., Middletown, N. Y.

SAWS, Circular Metal Cutting

Brown & Sharpe Mfg. Co., Providence, R. I. Consolidated Mch. Tool Corp., Rochester, N. Y. DoAll Co., 254 Laurel Ave., Des Plaines, Ill. Espen-Lucas Machine Works, Front St. and Girard Ave., Philadelphia, Pa. Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich. Motch & Merryweather Mchry. Co., Penton Bldg., Cleveland, Ohio.
National Twist Drill & Tool Co., & Winter Bros. Co.. Rochester. Mich. Co., Rochester, Mich. Simonds Saw & Steel Co., 470 Main St., Fitch-Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Union Twist Drill Co., Athol, Mass.
Walker-Turner Div., Kearney & Trecker Corp.,
South Ave., Plainfield, N. J.

SAWS, Metal Cutting Band

Awa, metal Cutting Band

Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago, III.

Delta Power Tool Div., Rockwell Mfg. Co.,
614G N. Lexington Ave., Pittsburgh 8, Pa.
DoAli Co., 254 Laurel Ave., Des Plaines, III.
Ryerson, Joseph T., & Son, Inc., 2558 W. 16th
St., Chicago 18, III.
Simonds Saw & Steel Co., 470 Main St., Fitchburg. Mass. burg, Mass.
Starrett, The L. S., Co., Athol, Mass.
Walker-Turner Div., Kearney & Trecker Corp.,
South Ave., Plainfield, N. J.

SAWS, Portable Electric

Black & Decker Mfg. Co., E. Penna. Ave., Towson, Md. Mall Tool Co., 7740 S. Chicago Ave., Chicago, Millers Falls Co., Greenfield, Mass. Skilsaw, Inc., 5033 N. Elston St., Chicago, III.

SAWS, Screw Slotting

Barber-Colman Co., Rock and Montague, Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Twist Drill & Tool Co., & Winter Bros.
Co., Rochester, Mich.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Starrett, The L. S., Co., Athol, Mass.
Union Twist Drill Co., Athol, Mass.

SCRAPERS, Hand and Power

Anderson Bros. Mfg. Co., 1910 Kishwaukee St., Rockford, III.

SCREW DRIVERS, Power

Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y. Ingersoll-Rand Co., Phillipsburg, N. J.

SCREW DRIVING AND NUT SETTING EQUIPMENT

Black & Decker Mfg. Co., E. Penna Ave., Towson, Md. Errington Mechanical Laboratory, Inc., 24 Nor-wood Ave., Stapleton, S. I., N. Y. Ingersoll-Rand Co., Phillipsburg, N. J. Jarvis, Charles L., Co., Middletown, Conn.

SCREW MACHINE TOOLS AND EQUIPMENT

Bardons & Oliver, Inc., Ft. W. 9th St., Cleve-land 13, Ohio. Brown & Sharpe Mfg. Co., Providence, R. I.

Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis. Gorham Tool Co., 14400 Woodrow Wilson, Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, Ill.
Millers Falls Co., Greenfield, Mass.
National Acme Co., 170 E. 131st St., Cleveland, Ohio.
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.
Potter & Johnston Co., 1027 Newport Ave., Pawtucket, R. I.
R and L Tools, 1825 Bristol St., Philadelphia 40, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

SCREW MACHINE WORK

Aluminum Co. of America, Oliver Bldg., Pitts-burgh, Pa. Eastern Mch. Screw Corp., New Haven, Conn. Maryland Precision Instrument Co., 12 E. Lanvale St., Baltimore 2, Md. Morse Twist Drill & Mch. Co., New Bedford, Mass. National Acme Co., 170 E. 131st St., Cleveland, Ottemiller, W. H., Co., York, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
Wicaco Machine Corp., Stenton Ave. and
Louden St., Philadelphia, Pa.

SCREW MACHINES, Automatic Single and Multiple Spindle

Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Mch. Co., Inc., Windsor, Vt.
Cosa Corp., 405 Lexington Ave., New York 17,
N. Y.
Gorton, George, Mch. Co., 1110 W. 13th St.,
Racine, Wis.
Greenlee Bros. & Co., 12th and Columbia Aves.,
Rockford, III. Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. National Acme Co., 170 E. 131st St., Cleveland, National Acme Co., 170 E. 1313 St., Coloro Ohio.

New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.

Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y.

Triplex Machine Tool Corp., 125 Barclay St., New York, N. Y.

Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

SCREW MACHINES, Hand

See also Lathes, Turret.

Bardons & Oliver, Inc., Ft. W. 9th St., Cleveland 13, Ohio.
Brown & Sharpe Mfg. Co., Providence, R. I.
Gisholt Machine Co., 1245 E. Washington Ave.,
Madison 10, Wis.
Hardinge Bros., Inc., 1418 College Ave., Elmira,
N. Y. N. Y.
Rivett Lathe & Grinder, Inc., Brighton, Boston
35, Mass.
Simmons Mch. Tool Corp., 1600 N. Broadway,
Albany, N. Y.
Warner & Swasey Co., 5701 Carnegie Ave.,
Cleveland 3, Ohio.

SCREW PLATES

Butterfield Div., Union Twist Drill Co., Derby Butterfield Div., Union Twist Dill Co., Line, Vt.
Card, S. W., Mfg. Co., Div. Union Twist Drill
Co., Mansfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt' & Whitney, West Hartford 1, Conn.
Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass.
Winter Bros. Co., Rochester, Mich.

SCREWS, Cap, Set, Safety Set and Machine, Etc.

Allen Mfg. Co., 133 Sheldon St., Hartford 2, Conn. Allied Products Corp., 12677 Burt Rd., Detroit Allied Products Corp., 12677 Burt Rd., Detroit 23, Mich.
Bristol Co., Platts Mills, Waterbury, Conn.
Chicago Screw Co., Bellwood, III.
National Acme Co., 170 E. 131st St., Cleveland, Ohio.
Ottemiller, W. H., Co., York, Pa.
Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.
Republic Steel Corp, Bolt & Nut Div., Republic Bldg., Cleveland 1, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., 100 Midland Ave., Port Chester, N. Y.
Standard Pressed Steel Co., Jenkintown, Pa. (Continued on page 362)

56 Parts per hour...

BAKER

nd, Key

its-

ord.

nd,

17,

St.,

an-

nd.

le

St.,

ira.

ton

KEEPS MORTAR SHELLS ROLLING OFF THE LINE!

Better machine tools are the bulwark of American defense. Today, from coast-to-coast, Baker special machines are hard at work increasing production figures in the manufacturing plants across the nation... New Baker special machines are rolling off the line for even greater productivity, as fast as they can be designed and manufactured.

Increased production is attained in boring and counterboring operations on 4.2 inch chemical mortar shells with Baker special machines. Rate of production . . . 56 parts-per-hour. The machine . . . Baker Model 30 HO. Heavy Duty Two Spindle Inverted Type Hydraulic Feed High Speed Boring Machine. The operations...chucking two shells; locating shells over spindles from fixed vee blocks, one each at upper and lower end of each shell; bore 3.73" diameter hole to 15 inch depth of cut; counterbore 3.74" diameter hole to 7/16 inch depth of cut.

Baker special machinery is designed to meet your specifications . . . consult Baker engineers regarding your specific job problems.

BAKER BROTHERS Inc., Toledo, O.

DRILLING, BORING, TAPPING, KEYSEATING AND CONTOUR GRINDING MACHINES

SCREWS, Self-Tapping Drive

Parker-Kalon Corp., 200 Varick St., New York

SCREWS, Thumb

Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio Parker-Kalon Corp., 200 Varick St., New York 14, N. Y. Russell, Burdsall & Ward Bolt & Nut Co., 100 Midland Ave., Port Chester, N. Y. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

SEALS AND RETAINERS, Oil or Grease

Garlock Packing Co., Palmyra, N. Y. Gits Bros. Mfg. Co., 1846-62 Kilbourn Ave, Chicago, III.

SECOND-HAND MACHINERY, Etc.

Eastern Machinery Co., 1006 Tennessee Ave., Cincinnati 22, Ohio. Miles Machinery Co., Box 770, Saginaw, Mich. Morey Mchry. Co., Inc., 410 Broome St., New York, N. Y. Simmons Mch. Tool Corp., 1600 N. Broadway, Albany, N. Y.

SEPARATORS, Centrifugal

De Laval Separator Co., Poughkeepsie, N. Y.

SEPARATORS, Oil or Coolant

Barnes Drill Co. (Magnetic), 814 Chestnut, Rockford, Ill. National Acme Co., 170 E. 131st St., Cleveland, Ohio.

SHAFTING, Steel

Bethlehem Steel Co., Bethlehem, Pa.
Cumberland Steel Co., Cumberland, Md.
De Laval Separator Co., Poughkeepsie, N. Y.
LaSalle Steel Co., Hammond, Ind.
Republic Steel Corp., Union Drawn Steel Div.,
Republic Bldg., Cleveland 1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.
Solar Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.

SHAFTS

National Forge & Ordnance Co., Irvine, Warren County, Pa. County, Pa. Standard Pressed Steel Co., Jenkintown, Pa.

SHAFTS, Flexible

Jarvis, Chas. L., Co., Middletown, Conn.

SHAFTS, Hollow Bored

Bethlehem Steel Co., Bethlehem, Pa.

SHAFTS, Turned and Ground

Bethlehem Steel Co., Bethlehem, Pa. Cumberland Steel Co., Cumberland, Md. LaSalle Steel Co., Hammond, Ind. National Forge & Ordnance Co., Irvine, Warren National Forge & Ordnance Co., Irvine, Warren County, Pa. Republic Steel Corp., Union Drawn Steel Div., Republic Bidg., Cleveland 1, Ohio. Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.

SHAPER-PLANERS

Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, III.

SHAPERS

American Tool Works Co., Pearl and Eggleston Aves., Cincinnati, Ohio.
Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio.
Columbia Machinery & Engineering Corp., Hamilton 1, Ohio.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Hendey Machine Co., Torrington, Conn. Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.
Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, Ill.
Sheldon Mch. Co., Inc., 4240-4258 N. Knox Ave., Chicago 41, Ill.

SHAPERS, Vertical

British Industries Corp., International Mchry. Div., 164 Duane St., New York, N. Y. Pratt & Whitney, West Hartford 1, Conn. Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, III.

SHAPES, Structural

Aluminum Co. of America, Oliver Bldg., Pitts-Alumnum Co. of America, Oliver Bldg., Pitts-burgh, Pa. Bethlehem Steel Co., Bethlehem, Pa. U. S. Steel Corp. (Carnegie-Hilinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co., Div.), 436 7th Ave., Pittsburgh, Pa.

SHEARING MACHINERY

American Pullmax Co., Inc., 2627 N. Western Ave., Chicago 47, III. Bethlehem Steel Co., Bethlehem, Pa. Buffalo Forge Co., 490 Broadway, Buffalo, N. Y. N. Y.
Cincinnati Shaper Co., Elam and Garrard Aves.,
Cincinnati, Ohio.
Cleveland Crane & Engrg. Co., Wickliffe, Ohio.
Cleveland Punch & Shear Works Co., 3917 St.
Clair Ave., N. E. Cleveland, Ohio.
Columbia Machinery & Engineering Corp.,
Hamilton 1, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Ferracute Machine Co., Bridgeton, N. J.
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,
III. III.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y.
Kling Bros. Engineering Works, 1320 No.
Kostner Ave., Chicago 51, III.
Morgan Engrg. Co., Alliance, Ohio.
Niagara Mch. & Tool Works, 683 Northland
Ave., Buffalo, N. Y.
O'Neill-Irwin Mfg. Co., Lake City, Minn.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, III.
Watson-Stillman Co., Aldene Rd., Roselle, N. J.
Williams-White & Co., Moline, III.
Yoder Co., 550 Walworth Ave., Cleveland, Ohio.

SHEARS, Alligator

Hill Acme Co., 1201 W. 65th St., Cleveland 2, Hydropress, Inc., 350 Fifth Ave., New York 1, N. Y.

SHEARS, Rotary

Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio.

Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Punch & Shear Works Co., 3917 St.
Clair Ave., N. E., Cleveland, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y.
Kling Bros. Engineering Works, 1320 No. N. Y.
Kling Bros. Engineering Works, 1320 No.
Kostner Ave., Chicago 51, III.
Niagara Mch. & Tool Works, 683 Northland
Ave., Buffalo, N. Y.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, III.
Simonds Saw & Steel Co. (Knives), 470 Main
St., Fitchburg, Mass.
Union Twist Drill Co., Athol, Mass.
Williams-White & Co., Moline, III.

SHEARS, Squaring

Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio. Cleveland Punch & Shear Works Co., 3917 St. Clair Ave., N. E., Cleveland, Ohio. Columbia Machinery & Engineering Corp., Hamilton I Ohio. Columbia Machinery & Engineering Corp., Hamilton 1, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y. Kling Bros. Engineering Works, 1320 No. Kostner Ave., Chicago 51, III.
Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.
Simonds Saw & Steel Co. (Blades), 470 Main St., Fitchburg, Mass.

SHEET METALS

Aluminum Co. of America, Oliver Bldg., Pittsburgh, Pa.
American Brass Co., 25 Broadway, New York, N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Inc., 1949 Rodney St., Waterbury 20, Conn.
Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio. Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.
Solar Steel Corp., Union Commerce Bldg., Cleveland, Ohio.
U. S. Steel Corp. (Carnegie-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co. Div.), 436 7th Ave., Pittsburgh, Pa.

SHEETS. Iron and Steel

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Bethlehem Steel Co., Bethlehem, Pa. Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio. 1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.
U. S. Steel Corp. (Carnegie-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co. Div.), 436 7th Ave., Pittsburgh, Pa.

SHIMS

Laminated Shim Co., Inc., Glenbrook, Conn.

Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.
Greenfield Tap & Die Corp., Greenfield, Mass.
Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.
Morse Twist Drill & Mch. Co., New Bedford, Mass. National Twist Drill & Tool Co., Rochester, Mich.
Mich.
Pratt & Whitney, West Hartford 1, Conn.
Standard Tool Co., 3950 Chester Ave., Cleve-Standard land, Ohio.
Union Twist Drill Co., Athol, Mass.

SLOTTING MACHINES

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio. Consolidated Mch. Tool Corp., Rochester, N. Y. Lobdell United Co., 2000 "G" St., Wilmington Lobdell 99, D 99, Del.
Rockford Mch. Tool Co., 2500 Kishwaukee St.,
Rockford, III.

SOCKETS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio. Greenfield Tap & Die Corp., Greenfield, Mass. Morse Twist Drill & Mch. Co., New Bedford, Mass. National Twist Drill & Tool Co., Rochester, National Twist Drill & Tool Co., Rochester, Mich. Prott & Whitney, West Hartford 1. Conn. Standard Tool Co., 3950 Chester Ave., Cleve-land, Ohio. Union Twist Drill Co., Athol, Mass. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

SPECIAL MACHINERY AND TOOLS

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.
Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.
Barnes Drill Co., 814 Chestnut, Rockford, Ill.
Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.
Bath, Cyril, Co., 6984 Machinery Ave., Cleveland 3, Ohio.
Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass.
Bethlehem Steel Co., Bethlehem, Pa.
Bilgram Gear & Mch. Works, 1217-35 Spring Garden St., Philadelphia, Pa.
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Blanchard Mch. Co., 64 State St., Cambridge, Mass. Mass.
Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio. Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Coldrial Broach Co., Detroit 13, Mich.
Columbia Machinery & Engineering Corp., Hamilton 1, Ohio.
Columbus Die, Tool & Mch. Co., 955 Cleveland Ave., Columbus, Ohio.
Consolidated Mch Tool Corp., Rochester, N. Y. Earle Gear & Mch. Co., 4707 Stenton Ave., Wayne Junction, Philadelphia 44, Pa.
Espen-Lucas Mch. Works, Front St. and Girard Ave., Philadelphia, Pa.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.
Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa.
Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Gorton, Geo., Mch. Co., 1110 W. 13th St., Chambersburg Engineering Co., Chambersburg, Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich. Gorton, Geo., Mch. Co., 1110 W. 13th St., Racine, Wis. Grant Mfg. & Mch. Co., 90 Silliman St., Bridge-port 5, Conn.

(Continued on page 364)



St.,

orp.

١.

St.,

ford, ester, leve-

101.

gton

St.,

trong

St.,

Mass. Iford,

ester.

leve-

ffalo

Div., nnati, a 42, III. r St., Eleve-Ave.,

nton, burg, Corp.,

eland

N. Y. Ave.,

Sirard etroit

St.,

Ave.,

St.,

idge-

Bridgeport MACHINES, INC.
Bridgeport, Connecticut

Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, III. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago III.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Unio.
Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
Mt. Gilead, Ohio.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y. Mt. Gilead, Ohio.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y.
Ingersell Milling Mch. Co., 2442 Douglas St.,
Rockford, Ill.
Jahn, B., Manufacturing Co., Ellis St., New
Britain, Conn.
Kingsbury Mch. Tool Corp., Keene, N. H.
Lake Erie Engrg. Corp., Kenmore Station, Buffalo, N. Y.
Lehmann Machine Co., 3560 Chouteau Ave.,
St. Louis, Mo.
Lipe-Rollway Corp., 806 Emerson Ave., Syracuse, N. Y.
Maryland Precision Instrument Co., 12 E.
Lanvale St., Baltimore 2, Md.
Michigan Tool Co., 7171 E. McNichols Rd.,
Detroit 12, Mich.
Moline Tool Co., 102 20th St., Moline, Ill.
Morgan Engrg. Co., Alliance, Ohio.
Motch & Merryweather Mchry. Co., Penton
Bldg., Cleveland, Ohio.
National Automatic Tool Co., Inc., S. 7th and
N Sts., Richmond, Ind.
National Broach & Mch. Co., 5600 St. Jean
Ave., Detroit 2, Mich.
National Tool Co., 11200 Madison Ave.,
Cleveland, Ohio.
National Twist Drill & Tool Co., Rochester,
Mich.
New Britain Mch. Co., New Britain-Gridley National Twist Drill & Tool Co., Rochester, Mich.
New Britain Mch. Co., New Britain-Gridley Mch. Div., New Britain, Conn.
New Jersey Gear & Mfg. Co., 1470 Chestnut Ave., Hillside, N. J.
Niagara Mch. & Tool Works, 683 Northland Ave., Buffalo, N. Y.
Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis. Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis. Pioneer Engrg. & Mfg. Co., 19679 John R St., Detroit, Mich. Pioneer Pump & Mfg. Co., 19679 John R St., Detroit, Mich. Pratt & Whitney, West Hartford 1, Conn. Read-Prentice Corp., 677 Cambridge St., Worcester, Mass. Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass. Seneca Falls Mch. Co., Seneca Falls, N. Y. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III. Taft-Peirce Mfg. Co., Woonsocket, R. I. Union Twist Drill Co., Athol, Mass. V & O Press Co., Div., Embart Mfg. Co., Hudson, N. Y. Waltham Machine Works, Newton St., Waltham, Mass. Wicaco Machine Corp., Stenton Ave. and Louden St., Philadelphia, Pa. Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio.

SPEED REDUCERS

Atlantic Gear Works, Inc., 200 Lafayette St., New York 12, N. Y. Boston Gear Works, Inc., North Quincy 71, Mass. Brad Foote Gear Works, 1309 S. Cicero Ave., Cicero 50, Ill. Cleveland Worm & Gear Co., 3249 E. 80th St., Cleveland, Ohio. Cone-Drive Gears, Div. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Farrel-Birmingham Co., Inc., 25 Main St., Ansonia, Conn. General Electric Co., Schenectady, N. Y. Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio. Perkins Mch. & Gear Co., Box 1611, Springfield Perkins Mch. & Gear Co., Box 1611, Springfield 2, Mass. Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa. Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y. Twin Disc Clutch Co., 1361 Racine St., Racine, Wis.

SPINDLES, Grinding

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Pope Mchry. Corp., Haverhill, Mass.

SPINNING LATHES

See Chucking Machines.

SPROCKET CHAINS

Atlantic Gear Works, Inc., 200 Lafayette St., New York 12, N. Y. Boston Gear Works, Inc., North Quincy 71,

Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio. Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa.

SPROCKETS

Atlantic Gear Works, Inc., 200 Lafayette St., New York 12, N. Y. Boston Gear Works, Inc., North Quincy 71, Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn. Ohio Gear Co., 1333 E. 179th St., Cleveland, St., Flatistic., 1333 E. 179th St., Ohio Gear Co., 1333 E. 179th St., Ohio.
Philadelphia Gear Works, Inc., Erie Ave. and G St., Philadelphia, Pa.
Stahl Gear & Mch. Co., 3901 Hamilton Ave., Cleveland 14, Ohio.

STAMPINGS, All Metal

LaSalle Steel Co., Hammond, Ind.

STAMPINGS, Sheet Metal

Aluminum Co. of America, Oliver Bldg., Pitts-Aluminum Co. of America, Oliver Bldg., Pitts-burgh, Pa.
Dayton Rogers Mfg. Co., 2824 13th Ave., S., Minneapolis 7, Minn.
Laminated Shim Co., Inc., Glenbrook, Conn.
Republic Steel Corp., Niles Steel Products Div., Republic Bldg., Cleveland 1, Ohio.
Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

STEEL

Allegheny Ludium Steel Corp., Pittsburgh, Pa.
American Steel & Wire Co., Div. U. S. Steel
Corp., Rockefeller Bldg., Cleveland, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co., Gending, Pa.
Crucible Steel Co. of America, Chrysler Bldg.,
New York, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St.,
New York 13, N. Y.
Holliday, W. J., & Co., Hammond, Ind.
National Forge & Ordnance Co., Irvine, Warren
Country, Pa.
Republic Steel Corp., Republic Bldg., Cleveland
1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Solar Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.
Timken Roller Bearing Co., Canton, Ohio. Cleveland, Ohio.
Timken Roller Bearing Co., Canton, Ohio.
U. S. Steel Corp. (American Steel & Wire Co.
Div., Carnegie-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron &
R. R. Co. Div.), 436 7th Ave., Pittsburgh, Pa.
U. S. Steel Supply Div., U. S. Steel Co., 208 S.
La Salle St., Chicago 4, Ill.
Wheelock-Lovejoy & Co., Inc., Cambridge, Mass.

STEEL, Cold Drawn

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Steel & Wire Co., Div. U. S. Steel
Corp., Rockefeller Bldg., Cleveland, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Crucible Steel Co. of America, Chrysler Bldg.,
New York, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa. Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
LaSalle Steel Co., Hammond, Ind.
Republic Steel Corp., Union Drawn Steel Div.,
Massillon, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.
Solar Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.
Timken Roller Bearing Co., Canton, Ohio.
U. S. Steel Corp. (American Steel & Wire Co.
Div.), 436 7th Ave., Pittsburgh, Pa.
Wheelock-Lovejoy & Co., Inc., Cambridge, Mass.

STEEL, High Speed Tool STEEL, High Speed Tool

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Armstrong Bros. Tool Co., 5200 W. Armstrong
Ave., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bldg.,
New York, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Republic Steel Corp., Republic Bldg., Cleveland
1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, Ill.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Solar Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass. STEEL, Machine

STEEL, Machine
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bldg.,
New York, N. Y.
Holliday, W. J., & Co., Hammond, Ind.
LaSalle Steel Co., Hammond, Ind.
Republic Steel Corp., Republic Bldg., Cleveland
1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, III.
Solar Steel Corp., Union Commerce Bldg.,
Cleveland, Ohio.
Timken Roller Bearing Co., Canton, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL, Stainless

Alleghney Ludlum Steel Corp., Pittsburgh, Pa.
American Steel & Wire Co., Div. U. S. Steel
Corp., Rockefeller Bldg., Cleveland, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bldg.,
New York, N. Y.
Firth Sterling Steel & Carbide Corp., McKeesport. Pa. Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York 13, N. Y.
Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.
Timken Roller Bearing Co., Canton, Ohio.
U. S. Steel Corp. (American Steel & Wire Co. Div., Carnegie-Illinois Steel Corp. Div.), 436
7th Ave, Pittsburgh, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass,

STEEL, Strip and Sheet

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Steel & Wire Co., Div. U. S. Steel
Corp., Rockefeller Bldg., Cleveland, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St.,
New York 13, N. Y.
Republic Steel Corp., Republic Bldg., Cleveland
1. Ohio. Republic Steel Corp., Republic Blag., Cleveland 1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.
Solar Steel Corp., Union Commerce Bldg., Cleveland, Ohio.
U. S. Steel Corp. (American Steel & Wire Co. Div., Carnegie-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co. Div.), 436 7th Ave., Pittsburgh, Pa.

STEEL, Tool and Die

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Carpenter Steel Co., Reading, Pa. Firth Sterling Steel & Carbide Corp., McKeesport, Pa. Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio. Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mu Steel olar Steel Corp., Union Commerce Bldg., Cleveland, Ohio. Mass Solar

STEEL, Zinc, Tin and Copper Coated Strip

Allegheny Ludium Steel Corp., Pittsburgh, Pa. Solar Steel Corp., Union Commerce Bldg., Cleveland, Ohio.

STEEL ALLOYS

See Alloys, Steel.

STEEL BARS-See Bars, Steel.

STEEL STOCK GROUND FLAT

Brown & Sharpe Mfg. Co., Providence, R. I. Starrett, The L. S., Co., Athol, Mass.

STELLITE

Haynes Stellite Div., Union Carbide & Carbon Corp. (Alloy), 30 E. 42nd St., New York, N. Y.

STOCKS, Die

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.
Butterfield Div., Union Twist Drill Co., Derby Line, Vt., Card, S. W., Mfg. Co., Div. Union Twist Drill Co., Mansfield, Mass.
Greenfield Tap & Die Corp., Greenfield, Mass. Morse Twist Drill & Mch. Co., New Bedford, Mass. Pratt & Whitney, West Hartford 1, Conn. Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass.



dg.,

OSS.

dg.,

St., and St.,

ass.

St.,

Co.

a.

and

dg.,

Drill

vê-

STONES, Oil or Sharpening

Bay State Abrasive Co., Westboro, Mass. Carborundum Co., Buffalo Ave., Niagara Falls, N. Y. Norton Co., 1 New Bond St., Worcester 6, Mass.

STOOLS

Standard Pressed Steel Co., Jenkintown, Pa.

STRAIGHTEDGES

Rahn Granite Surface Plate Co., 637 N. Western Ave., Dayton, Ohio. Starrett, The L. S., Co., Athol, Mass.

STRAIGHTENERS, Flat Stock and Wire

Nilson, A. H., Mch. Co., 1506 Railroad Ave., Bridgeport, Conn. U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

STRAIGHTENING MACHINERY

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincinnati, Ohio.
Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Colonial Broach Co., Detroit 13, Mich.
Columbia Machinery & Engineering Corp., Hamilton 1, Ohio.
Consolidated Mch. Tool Corp., Rochester, N. Y.
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III. III.
Hydraulic Press Mfg. Co., 300 Lincoln Ave.,
Mt. Gilead, Ohio.
Hydropress, Inc., 350 Fifth Ave., New York 1,
N. Y.
Lake Erie Engrg. Corp., Kenmore Station,
Buffalo, N. Y.
Morse Twist Drill & Mch. Co., New Bedford,
Mass.
Oilgear Co., 1560 W. Pierce St., Milwaukee 4,
Wis. Springfield Mch. Tool Co., Springfield, Ohio. Watson-Stillman Co., Aldene Rd., Roselle, N. J.

STRIPPING UNITS. Die

Wales-Strippit Corp., North Tonawanda, N. Y.

STUD SETTERS

Errington Mechanical Laboratory, Inc., 24 Norwood Ave., Stapleton, S. I., N. Y. Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, III.

SUB-PRESSES

Waltham Machine Works, Newton St., Waltham, Mass.

SUPERFINISHING MACHINES

Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.

SURFACE PLATES

See Plates, Surface.

SWAGING MACHINES

Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio. Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn. Torrington Co., Torrington, Conn.

SWITCHES

Allen-Bradley Co., 1326 S. 2nd St., Milwaukee, Allen-Bradley Co., 1326 S. 2nd St., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Micro Switch Div., Minneapolis-Honeywell Regulator Co., Freeport, III.
National Acme Co., 170 E. 131st St., Cleveland, Ohio.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

TACHOMETERS

Bristol Co., Platts Falls, Waterbury, Conn.
Scherr, George, Co., Inc., 200 Lafayette St.,
New York 12, N. Y.
Veeder-Root, Inc., 20 Sargent St., Hartford,

TAPER PINS, Standard

Chicago Screw Co., Bellwood, III. Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney, West Hartford 1, Conn.

TAP HOLDERS

Ave., Los Angeles 34, Calif.
Errington Mechanical Laboratory, Inc., 24 Norwood Ave., Stapleton, S. I., N. Y.
Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, III.

TAPPING ATTACHMENTS AND DEVICES

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio. Brown & Sharpe Mfg. Co., Providence, R. I. Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor, Mich. Buhr Mch. Tool Co., 839 Buhr St., Ann Arbor, Mich.
Errington Mechanical Laboratory, Inc., 24 Norwood Ave., Stapleton S. I., N. Y.
Ettco Tool Co., Inc., 592 Johnson Ave., Brooklyn, N. Y.
Jarvis, Chas. L., Co., Middletown, Conn.
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass cester, Mass. Procunier Safety Chuck Co., 18 S. Clinton St., Procurier Safety Clidek Co., 13 5 Chicago, Ill. Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill. Thriftmaster Products Corp., 1076 N. Plum St., Lancaster, Pa.

TAPPING MACHINES

Baker Bros., Inc., Station F, P. O. Box 101, Toledo 10, Ohio. Barnes Drill Co., 814 Chestnut, Rockford, Ill. Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill. Rockford, III.
Baush Machine Tool Co., 156 Wason Ave.,
Springfield 7, Mass.
Bodine Corp., 317 Mt. Grove St., Bridgeport,
Conn. Conn.
Buffalo Forge Co., 490 Broadway, Buffalo, Buffalo Forge Co., 490 Broadway, Barrell, N. Y. N. Y. Suhr Mch. Tool Co., 839 Buhr St., Ann Arbor, Mich. Challenge Mchry, Co., Grand Haven, Mich. Cleveland Tapping Mch. Co., 1201 Camden Ave., S. W., Canton 6, Ohio. Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa. Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, III. Hamilton Tool Co., 834 South 9th St., Hamilton, Ohio. Rockford, III.
Hamilton Tool Co., 834 South 9th St., Hamilton, Ohio.
Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn.
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.
Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.
Jarvis, Chas. L., Co., Middletown, Conn.
Kaufman Manufacturing Co., Manitowoc, Wis.
Kingsbury Mch. Tool Corp., Keene, N. H.
Leland-Gifford Co., 1025 Southbridge St., Worcester, Mass.
Moline Tool Co., 102 20th St., Moline, Ill.
National Acme Co., 170 E. 131st St., Cleveland, Ohio.
National Automatic Tool Co., Inc., S. 7th and N Sts., Richmond, Ind.
Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, Ill.
Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

TAPPING MACHINES, Nut

Hill Acme Co., 1201 W. 65th St., Cleveland 2, Onio. National Machinery Co., Greenfield and Stanton Sts., Tiffin, Ohio. Snow Mfg Co., 435 Eastern Ave., Bellwood, III.

TAPS

TAPS

Bath, John, Co., Inc., Worcester, Mass.
Besly-Welles Corp., Beloit, Wis.
Butterfield Div., Union Twist Drill Co., Derby
Line, Vt.
Card, S. W., Mfg. Co., Div. Union Twist Drill
Co., Mansfield, Mass.
Continental Tool Works, Div. Ex-Cell-O Corp.,
Detroit 32, Mich.
Detroit Tap & Tool Co., Detroit, Mich.
Geometric Tool Co., Westville Station, New
Haven 15, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hy-Pro Tool Co., 100 Mt. Pleasant Ave., New
Bedford, Mass.
Landis Mch. Co. (Solid Adjustable), Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford,
Mass.
Morse Twist Drill & Mch. Co., New Bedford,
Mass.

Mass.
Pratt & Whitney, West Hartford 1, Conn.
Sheffield Corp., 721 Springfield, Dayton, Ohio.
Standard Tool Co., 3950 Chester Ave., Cleveland Ohio.

Threadwell Tap & Die Co., 16 Arch St., Greenfield, Mass. Winter Bros. Co., Rochester, Mich. Wood & Spencer Co., 1930 E. 61st St., Cleveland, Ohio.

TAPS, Collapsing

Geometric Tool Co., Westville Station, New Haven 15, Conn. Landis Mch. Co., Waynesboro, Pa. National Acme Co., 170 E. 131st St., Cleveland, Ohio. Sheffield Corp., 721 Springfield, Dayton, Ohio.

TELESCOPES, Alignment

Engis Equipment Co., 431 S. Dearborn St., Chicago 5, III.

THERMOMETERS, Indicating and Recording

Bristol Co., Platts Mills, Waterbury, Conn.

THREAD CUTTING MACHINERY

THREAD CUTTING MACHINERY
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Tapping Mch. Co., 1201 Camden
Ave., S. W., Canton 6, Ohio.
Cosa Corp., 405 Lexington Ave., New York 17,
N. Y. Thompson Co., 6411 W. Burnham St.,
Milwaukee 14, Wis.
Eastern Mch. Screw Corp., New Haven, Conn.
Fellows Gear Shaper Co., 78 River St., Springfield, Vt.
Grant Mfg. & Mch. Co., 90 Silliman St., Bridgeport 5, Conn.
Hill Acme Co., 1201 W. 65th St., Cleveland 2,
Ohio. port 3, com.

Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.

Hirschmann, Carl, Co., 30 Park Ave., Manhasset, N. Y.

Kaufman Manufacturing Co., Manitowoc, Wis.

Landis Mch. Co., Waynesboro, Pa.

Pratt & Whitney, West Hartford 1, Conn.

Procunier Safety Chuck Co., 18 S. Clinton St., Chicago, Ill.

Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

Rogers Machine Works, Inc., Buffalo 10, N. Y.

Snow Mfg. Co., 435 Eastern Ave., Bellwood, Ill.

Taft-Peirce Mfg. Co., Woonsocket, R. I.

Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

THREAD CUTTING TOOLS

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.
Detroit Tap & Tool Co., Detroit, Mich.
Eastern Mch. Screw Corp., New Haven, Conn.
Ex-Cell-0 Corp., 1200 Oakman Blvd., Detroit
32, Mich. 32, Mich.
Fellows Gear Shaper Co., 78 River St., Springfield. Vt.
Geometric Tool Co., Westville Station, New Haven 15, Conn.
Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.
Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.
Landis Mch. Co., Waynesboro, Pa.
Pratt & Whitney, West Hartford 1, Conn.
Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.
Sheffield Corp., 721 Springfield, Dayton, Ohio. Rivett Laine a Ginson, his, and as 35, Mass.

Sheffield Corp., 721 Springfield, Dayton, Ohio. Taft-Peirce Mfa. Co., Woonsocket, R. I. Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

Williams, J. H., & Co., 400 Vulcan St., Buffala 7, N. Y.

THREAD GAGES

See Gages, Thread.

THREAD GRINDING MACHINES

See Grinding Machines, Thread.

THREAD MILLING MACHINES

Cross Co., 3250 Bellevue Ave., Detroit 7, Mich. Pratt & Whitney, West Hartford 1, Conn. Sheffield Corp., 721 Springfield, Dayton, Ohio. Waltham Machine Works, Newton St., Waltham, Mass.

THREAD ROLLING MACHINES

Hartford Special Mchry. Co., 287 Homestead St., Hartford, Conn. Hill Acme Co., 1201 W. 65th St., Cleveland 2, Hill Acme Co., 1201 VI. Soll Park Ave., Man-Ohio. Hirschmann, Carl, Co., 30 Park Ave., Man-hasset, N. Y. V & O Press Co., Div. Emhart Mfg. Co., Hudson, N. Y. (Continued on page 368)

tac



leve-

New land

hio.

St.,

l. nden k 17, 1 St.,

nn. ring-

idge-

nd 2,

Man-

Wis.

St.,

oston

N. Y.

Ave.,

rong

nn. etroit

ring-New Ison, d 2,

ston

Ohio,

lvd.,

ffala

ead

d 2,

ian-Co...

WERNER

LLERS

From PIGMY Size 0 to GIANT 5

VERTICAL:

Size 0 to 5

Table sizes 22" x 17" up to 90" x 20"

PLAIN:

Size 0 to 4

Table sizes 22" x 7" up to 76" x 151/2"

UNIVERSAL:

Size 1 to 4

Table sizes 29" x 8" up to 76" x 15"

- also -

MANUFACTURING MILLERS:

Sizes 1, 2, 3 2-19 3-25

Shown Above:

No. 0 Vertical

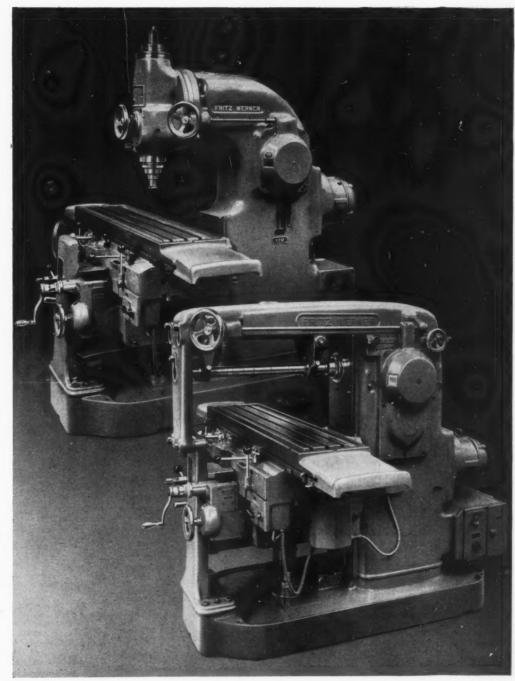
Shown at Right:

No. 3 Vertical

No. 3 Plain

PROMPT and REASONABLE DELIVERIES

For further information about these and other machines contact Dept. M.



MARAC MACHINERY CORP. 1819 B'WAY • N.Y. 23

MACHINERY, August, 1952-367

TIN AND TERNEPLATES

Bethlehem Steel Co, Bethlehem, Pa. Republic Steel Corp., Republic Bldg., Cleveland

Solar Steel Corp., Union Commerce Bldg., Cleveland, Ohio.

S. Steel Corp. (Carnegie-Illinois Steel Corp. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co., Div.), 436 7th Ave., Pittsburgh, Pa

TOOL BITS, High Speed Steel

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.

Carpenter Steel Co., Reading, Pa.

Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y.

Firth Sterling Steel & Carbide Corp., McKees-

Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.

Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III.

Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass. Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

Wheelock, Lovejoy & Co., Inc., Cambridge, Mass. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

TOOLS BITS, Special Alloy

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio.

Firth Sterling Steel & Carbide Corp., McKees-

Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.

Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.

Kennametal, Inc., Latrobe, Pa. Wesson Co., 1220 Woodward Heights Blvd., Wesson Co., 122 Ferndale, Mich.

TOOL GRINDERS

See Grinding Machines for Sharpening, Turning and Planing Tools.

TOOL HOLDERS

Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn.

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.

Blake, Ed., Co., 442 Cherry St., West Newton 65, Mass.

Burg Tool Manufacturing Co., 3743 Durango Ave., Los Angeles 34, Calif. Davis Boring Tool Div., Giddings & Lewis Machine Tool Co., Fond du Lac, Wis..

Lovejoy Tool Co., Inc., Springfield, Vt.
Michigan Tool Co., 7171 E. McNichols Rd.,
Detroit, Mich.

Millholland, W. K., Mchry. Co., 6402 Westfield Blvd., Indianapolis 5, Ind. R and L Tools, 1825 Bristol St., Philadelphia 40, Pa.

Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio. Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich.

Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

TOOLMAKERS' INSTRUMENTS

Ames, B. C., Co., Waltham 54, Mass. Brown & Sharpe Mfg. Co., Providence, R. I. Scherr, George, Co., Inc., 200 Lafayette St., New York 12, N. Y. Starrett, The L. S., Co., Athol, Mass

TOOL STEEL

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Bethlehem Steel Co., Bethlehem, Pa. Carpenter Steel Co., Reading, Pa. Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y. Firth Sterling Steel & Carbide Corp., McKees-

Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio.

Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, III. Solar Steel Corp., Union Commerce Bldg., Cleveland, Ohio.

TOOLS, Carbide-Tipped

Adamas Carbide Corp., 999 South 4th St., Harrison, N. J.

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Atrax Co., Newington, Conn.

Arrax Co., Newington, Conn.
Carboloy Dept., General Electric Co., Box 237,
Roosevelt Park Annex, Detroit 32, Mich.
Cleveland Twist Drill Co., 1242 E. 49th St.,
Cleveland, Ohio.

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Firth Sterling Steel & Carbide Corp., McKees-

Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich.

Colonial Broach Co., Detroit 13, Mich. Kennametal, Inc., Latrobe, Pa.

Metal Carbides Corp., Youngstown, Ohio. Morse Twist Drill & Mch. Co., New Bedford, Mass.

Severance Tool Industries, Inc., 636 lowa Ave., Saginaw, Mich. Super Tool Co., 21650 Hoover Rd., Detroit 13,

Mich

Union Twist Drill Co., Athol, Mass.
Willey's Carbide Tool Co., 1340 W. Vernor
Hwy., Detroit 1, Mich.

TOOLS, Lathe, Shaper and Planer

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Apex Tool & Cutter Co., Inc., 237 Canal St., Shelton, Conn.

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.

Bullard Co., Brewster St., Bridgeport 2, Conn Carboloy Dept., General Electric Co., Box 237, Roosevelt Park Annex, Detroit 32, Mich.

Firth Sterling Steel & Carbide Corp., McKeesport, Pa.

Gorham Tool Co., 14400 Woodrow Wilson, Detroit, Mich. Haynes Stellite Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y. Kennametal, Inc., Latrobe, Pa.

Lovejoy Tool Co., Inc., Springfield, Vt. Northwestern Tool & Engrg. Co., 117 Hollier, Dayton, Ohio.

Super Tool Co., 21650 Hoover Road, Detroit 13, Mich.

Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

Wesson Co., 1220 Woodward Heights Blvd., Ferndale, Mich. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

TRANSFER MACHINES, Automotic

Rockford, III.
Colonial Broach Co., Detroit 13, Mich.
Cross Co., 3250 Bellevue Ave., Detroit 7, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. 32, Mich.
Sundstrand Mch. Tool Co., 2531 11th St.,
Rockford, III.

TRANSFORMERS

General Electric Co., Schenectady, N. Y.

TRANSMISSION, Variable Speed

Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis Wis. Reliance Elec. & Engrg. Co., Collinwood Station, 1088 Ivanhoe Rd., Cleveland, Ohio. Sundstrand Mch. Tool Co., 2531 11th St., Rockford, Ill.

TUBE FLANGING MACHINES

Grant Mfg. & Mch. Co., 90 Silliman St., Bridge-port 5, Conn. Williams-White & Co., Moline, III.

TUBE FORMING AND WELDING MACHINES

American Elec. Fusion Corp., 2606 Diversey Ave., W., Chicago, III. Yoder Co., 5500 Walworth Ave., Cleveland, Ohio.

TUBE TESTING AND EXPANDING MACHINES

Hydropress, Inc., 350 Fifth Ave., New York 1,

TUBING, Aluminum

Aluminum Co. of America, Oliver Bldg., Pitts-burgh, Pa.

TUBING, Brass and Copper

American Brass Co., 25 Broadway, New York,

Chase Brass & Copper Co., Inc., 1949 Rodney St., Waterbury 20, Conn. Revere Copper & Brass Inc., 230 Park Ave., New York, N. Y.

TUBING, Flexible

American Metal Hose Br. American Brass Co., 25 Broadway, New York, N. Y. Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N. J.

TUBING, Steel

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Bethlehem Steel Co., Bethlehem, Pa.

Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Frasse, Peter A., & Co., Inc. (Seamless),
17 Grand St., New York 13, N. Y.
Republic Steel Corp., Steel & Tubes Div., Republic Bldg., Cleveland 1, Ohio.
Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St.,
Chicago 18, III.

Solar Steel Corp., Union Commerce Bldg., Cleveland, Ohio.

Timken Roller Bearing Co., Canton, Ohio. U. S. Steel Corp., National Tube Co. Div., 436 7th Ave., Pittsburgh, Pa.

TWIST DRILLS

See Drills, Twist.

UNIVERSAL JOINTS

Baush Machine Tool Co., 156 Wason Ave., Springfield 7, Mass. Boston Gear Works, Inc., North Quincy 71,

VALVE CONTROLS

Philadelphia Gear Works (Motorized), Erie Ave., and G St., Philadelphia, Pa.

VALVES, Air

Hunt, C. B., & Son, Inc., 1911 E. Pershing St., Salem, Ohio. Mead Specialties Co., 4114 North Knox Ave., Chicago 41, III.

Ross Operating Valve Co., 120 E. Golden Gate, Detroit, Mich.

VALVES, Hydraulic

American Steel Foundries, Elmes Engrg. Div., Paddock Rd. and Tennessee Ave., Cincin-nati, Ohio.

Baldwin-Lima-Hamilton Corp., Philadelphia 42,

Barnes, John S., Corp., Rockford, III. Denison Engrg. Co., 1160 Dublin St., Columbus 16, Ohio.

Hannifin Corp., 1101 S. Kilbourn Ave., Chicago,

Hunt, C. B., & Son, Inc., 1911 E. Pershing St., Salem, Ohio.

Hydraulic Press Mfg. Co., 300 Lincoln Ave., Mt. Gilead, Ohio.

Hydropress, Inc., 350 Fifth Ave., New York 1, Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.

Rivett Lathe & Grinder, Inc., Brighton, Boston 35, Mass.

(Continued on page 370)



rsey and,

(1,

tts-

ney

Co.,

Pa.

Re-St.,

Div.,

ve., 71,

ve.,

St., ve., ate,

iv., cin-

bus ago, St., ve.,

: 1,

4,

ton

GENERAL INFORMATION BY: GENERALKOMMISSARIAT DER 2. EUROPAEISCHEN WERKZEUGMASCHINEN-AUSSTELLUNG

HANNOVER-MESSEGELAENDE (GERMANY)
TEL: 86501—CABLE ADDRESS: MODUL—TELEPRINTER: 023728

Sundstrand Mch. Tool Co., 2531 11th St., Rockford, III. Watson-Stillman Co., Aldene Rd., Roselle, N. J.

VALVES, Pneumatic

Hanna Engineering Works, 1752 Elston Ave., Chicago, III. Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, Rivett Lathe & Grinder, Inc., Brighton, Boston

VIBRATION INSULATION

American Felt Co., Glenville, Conn.

VISES, Machine

Armstrong-Blum Mfg. Co., 5700 W. Blooming-dale Ave., Chicago, III.
Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.
Brown & Sharpe Mfg. Co., Providence, R. I.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa.
Fenn Mfg. Co., Hartford, Conn.
Hannifin Corp., 1101 S. Kilbourn Ave., Chicago, III.
Hendey Mch. Co. Torinata. III.
Hendey Mch. Co., Torrington, Conn.
Martin, J. E., Mch. Works, 548 W. State St.,
Springfield, Ohio
Neise, Karl A., Dept. M, 381 Fourth Ave.,
New York 16, N. Y.
Producto Mch. Co., 990 Housatonic Ave.,
Bridgeport, Conn.
Skinner Chuck Co., 344 Church St., New Britain,
Conn.

VISES, Pipe

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

VISES, Planer and Shaper

Brown & Sharpe Mfg. Co., Providence, R. I. Cincinnati Shaper Co., Elam and Garrard Aves., Cincinnati, Ohio. Martin, J. E., Mch. Works, 548 W. State St., Springfield, Ohio. Rockford Mch. Tool Co., 2500 Kishwaukee St., Rockford, III.

Skinner Chuck Co., 344 Church St., New Britain, Conn.

VISES, Pneumatic

Mead Specialties Co., 4114 North Knox Ave., Chicago 41, III.

VOLTMETERS

Bristol Co., Platts Mills, Waterbury, Conn. General Electric Co., Schenectady, N. Y.

WASHERS, Lock

Eaton Mfg. Co., Reliance Div., 25 Charles Ave., S. E., Massillon, Ohio. Standard Locknut & Lockwasher, Inc., 510 N. Capitol Ave., Indianapolis, Ind.

WASHERS, Spring

Eaton Mfg. Co., Reliance Div., 25 Charles Ave., S. E., Massillon, Ohio.

WELDING AND CUTTING EQUIPMENT Oxyacetylene

Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y. Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.

WELDING AND CUTTING GAGES

Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y. Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y.

WELDING EQUIPMENT, Electric Arc

Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y.
Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. General Electric Co., Schenectady, N. Y. Lincoln Electric Co., 22801 St. Clair Ave., Cleveland, Ohio.

WELDING EQUIPMENT, Electric, Spot, Butt, Seam, Etc.

American Electric Fusion Corp., 2606 Diversey Ave., W., Chicago, III.

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. DoAll Co., 254 Laurel Ave., Des Plaines, III.

WELDING POSITIONER

Johnson Machine Works, 617 Menomonie St., Eau Claire, Wis.

WELDMENTS

Mahon, R. C., Co., Detroit 34, Mich. Woods, A. C., & Co., Div., Kropp Forge Co, 1129 Harrison Ave, Rockford, III.

EX

15

W

th

va

it

th fa

01

ir cl

American Steel & Wire Co., Div. U. S. Steel Corp., Rockefeller Bldg., Cleveland, Ohio. Bethlehem Steel Co., Bethlehem, Pa. Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio. epublic Steel Corp., Republic Bidg., Cleveland 1, Ohio. . S. Steel Corp. (American Steel & Wire Co. Div., Columbia Steel Co. Div., Tennessee Coal, Iron & R. R. Co. Div.), 436 7th Ave., Pittsburgh, Pa.

WIRE FORMING MACHINERY

Nilson, A. H., Mch. Co., 1506 Railroad Ave., Bridgeport, Conn. U. S. Tool Co., Inc., 255 North 18th St., Ampere, N. J.

WIRE NAIL MACHINERY

Bliss, E. W., Co., 1375 Raff Rd., S. W., Canton, Ohio. National Mchry. Co, Greenfield and Stanton Sts., Tiffin, Ohio. Ryerson, Jos. T., & Son, Inc., 2558 W. 16th St., Chicago 18, Ill.

WOODWORKING MACHINERY

Delta Power Tool Div., Rockwell Mfg. Co., 614G N. Lexington Ave., Pittsburgh 8, Pa. Frew Machine Co., 121 East Luray St., Philadelphia 20, Pa. Greenlee Bros. & Co., 12th and Columbia Aves., Rockford, Ill.
Onsrud Machine Works, Inc., 3940 Palmer St., Chicago, Ill.
Walker-Turner Div., Kearney & Trecker Corp., South Ave., Plainfield, N. J.

WORM DRIVES

Cleveland Worm & Gear Co., 3249 E. 80th St., Cleveland, Ohio. Cone-Drive Gear Div., Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Ohio Gear Co., 1333 E. 179th St., Cleveland, Ohio Ohio.
Philadelphia Gear Works, Erie Ave. and G St.,
Philadelphia, Pa.

WRENCHES

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.
Ingersoll-Rand Co. (Impact, Pneumatic, Electric), Phillipsburg, N. J.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

WRENCHES, Detachable Sockets

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.
Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

WRENCHES, Pipe

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III.

WRENCHES, Ratchet

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

WRENCHES, Tap

Butterfield Div., Union Twist Drill Co., Derby Line, Vt. Card, S. W., Mfg. Co., Div. Union Twist Drill Co., Mansfield, Mass. Greenfield Tap & Die Corp., Greenfield, Mass. Morse Twist Drill & Mch. Co., New Bedford, Mass.
Prott & Whitney, West Hartford 1, Conn.
Standard Tool Co., 3950 Chester Ave., Cleveland, Ohio.

WRENCHES, Torque Measuring

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago, III. Sturtevant, P. A., Co., Addison, III. Williams, J. H., & Co., 400 Vulcan St., Buffalo 7, N. Y.

POWERSHEAR

OFFERS CONTINUOUS ACTION plus

VARIABLE SPEED

from 30 to 200 strokes per minute

for high speed DIE-LESS DUPLICATING

The new Di-Acro POWERSHEAR has remarkable speed and accuracy for the production of small parts.

1. CONTINUOUS SHEARING ACTIONno clutch to engage! Feeding speed determines shearing speed.

2. VARIABLE SPEED - cycle quickly set for each shearing operation

3. EASE OF OPERATION — fatigue is reduced, production soars.

4. "SINGLE STROKE" SHEARING non-repeating safety clutch for jobs not adaptable to continuous shearing. Any plant doing high speed precision shearing on smaller parts cannot afford to be without the DI-ACRO POWERSHEAR. Available in 12° and 24" shearing widths, capacity 16 gauge sheet steel. Also standard model.

DOES PRECISION WORK ON ALL SHEARABLE MATERIALS STAINLESS STEEL and Many Other Materials MICA PLASTICS

diacro

MICA LEATHER
PLASTICS SILVER
BIMETALS MAGNESIUM
FIBRE COPPER ALUMINUM SILICON STEEL CHROME MOLY LEADED BRASS FIBRE SEND FOR 40 PAGE "DIE-LESS DUPLICATING" CATALOG

giving full details on Di-Acro Powershears, also Di-Acro Benders, Brakes, Rod Parters, Notchers, Rollers and Punches.



COMPANY · WAYNESBORO, PENNA., U.S.A.

EXCLUSIVE MANUFACTURERS OF THREAD GENERATING EQUIPMENT

15/16" in length. Internal tripping, by which the work piece opens the die head, assures the same thread length on each collar regardless of their variance in height. It also prevents any possibility of chaser breakage or die head damage by run-

St.,

Co,

teel

and

Co. ssee ve.,

St.,

ton, nton St.,

St.,

St., Co.,

St.,

falo

ve-

alo

FIG. 1

ning the work piece too far into the die head while threading. The bell shaped design of the trip bar facilitates the alignment and holding of the collar on the work holding fixture while under cut.

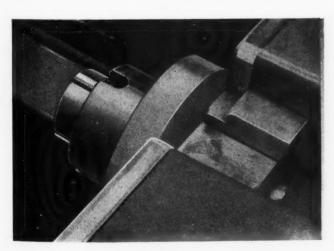


FIG. 2

Although special oversize chaser holders were furnished for this threading job, the chasers used in these holders were standard 11 pitch, U.N. form chasers. These chasers were supplied from our large chaser inventory and can be replaced immediately when the need arises. Usage of these chasers is not restricted to the diameter for which they were provided. They may be used for any diameter within the range of the die head by using proper chaser holders and if the thread form and pitch remain constant.

Now in operation at Harrisburg Steel, this machine has increased production and reduced

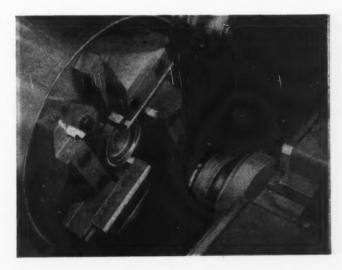


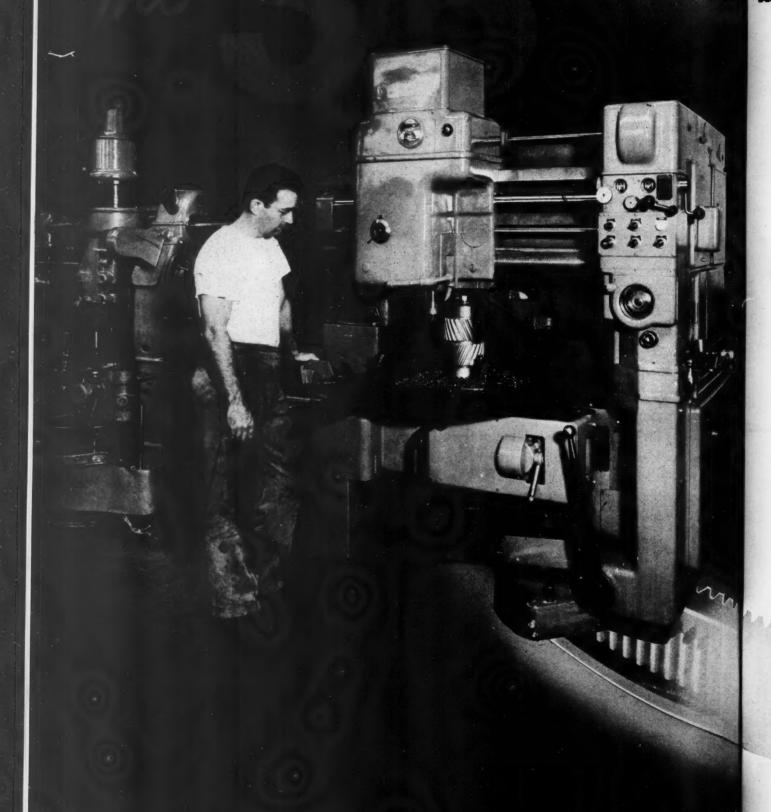
FIG. 3

threading cost on gas cylinder collars to their complete satisfaction. This is but one example of the many special work holding fixtures designed by Landis which enable the production of quality threads on unusual work pieces.



THE LANDIS Machine COMPANY
WAYNESBORD-9 . PENNSYLVANIA . U.S.A.

A Ge



S

Shaper for

HEAVY DUTY
SMALLER
GEARS

as well as those

UP-TO-36" CAPACITY

May we emphasize, once again, that the 36-Type Gear Shaper cuts small gears fast, too. More machines are bought for roughing and finishing 8, 10, 12 and 14 inch gears than for the sizes closer to its maximum limit of 36" pitch diameter.

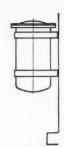
The secret of the ability of a 36-Type to cut costs—on the run of intermediate size work—as well as big gears—lies in its "beefed-up" design. You can take heavy cuts at high speed, and still hold to precision limits.

Wire, write or phone the Fellows Office nearest you whenever you have need to discuss ways of reducing costs on gear tooth machining operations.

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department: 78 River Street, Springfield, Vermont, U.S.A. Branch Offices: 323 Fisher Bldg., Detroit 2 • 5835 West North Ave., Chicago 39 • 2206 Empire State Bldg., New York 1

Helpful hints for Topnotch Performance



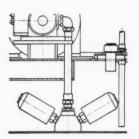
For contain Millicauti

in le 2) LU Mac

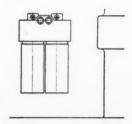
not sure tion

3) H
give be are clear work

Hydraulic oil filter—this one is accessibly located outside the rear base.

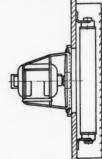


Hydraulic oil filters—a V-6 battery located in the oil reservoir.



Hydraulic oil filters—a fourcartridge unit, accessibly located outside the rear base.

from your...
CINCINNATI
HYDRO-TEL
MILLING
MACHINES



Filtered air cools the hydraulic pumps. Air filter is accessible for cleaning.



Internal and external curved surfaces, milled on a CINCINNATI 28" Vertical Hydro-Tel Milling Machine equipped for 360° profiling. You can count on continuous and dependable production of this type of work if you follow the recommendations outlined here.



CINCIN

For an indefinite period of time, you can easily maintain the dependability of the CINCINNATI Hydro-Tel Milling Machines in your shop. Here are a few precautions which you should keep in mind:

1) LEVELING Keep the machine level; you will be well repaid in accurate work and smoother cutting. Built-in leveling jacks are provided for this purpose.

2) LUBRICATION of your CINCINNATI Hydro-Tel Milling Machine is principally automatic, but even so, it cannot be neglected. Way oil is especially important. Be sure to follow the recommendations in the instruction book.

3) HYDRAULIC SYSTEM AND FILTERS Hydraulic oil gives your Hydro-Tel life; use a good grade. Oil must be CLEAN—CLEAN—CLEAN. Three types of filters are included in the hydraulic circuit. Inspect and clean them periodically. If tracer mechanism does not work smoothly, filter all the oil through an independent, portable oil filter. When draining the hydraulic

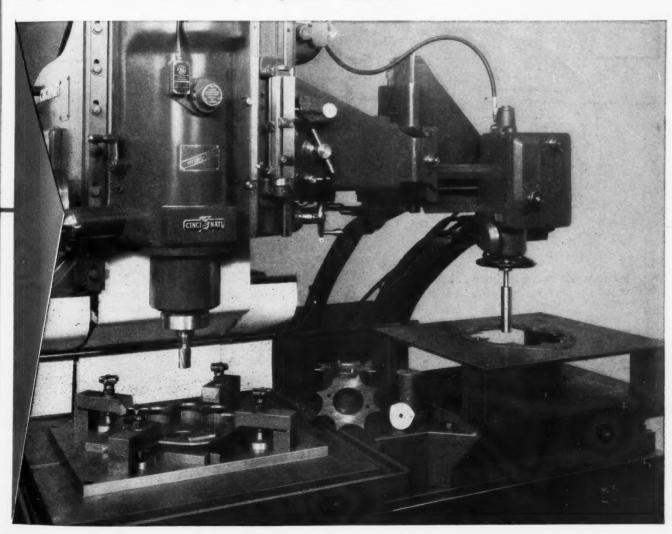
oil tank, squeegee sludge from reservoir; do not use rags; avoid splashing and turbulence when refilling.

4) FEED RATES FOR DIE-SINKING Power table or cross feed rates for die-sinking operations, when tracing up and down steep surfaces, depend upon the angle of the surface being traced; max. $1\frac{1}{2}$ " per min. for 85°, 10" for 60°, etc. Follow the recommendations in the instruction book; go slowly to avoid breaking the cutter or damaging the work on tracer mechanism.

The above preventive measures are well worth your consideration; they will help you obtain uninterrupted production from your CINCINNATI Hydro-Tel Milling Machines.

THE CINCINNATI MILLING MACHINE CO. CINCINNATI 9, OHIO

P.S. CINCINNATI Hydro-Tel Milling Machines are in critically short supply at this time, but if you're not familiar with them, you might like to have literature. Write for these catalogs: 16" Vertical, No. M-1497-1, 28" Vertical, No. M-1284-3, 36" Horizontal, No. M-1629.



NATI

MILLING MACHINES - CUTTER SHARPENING MACHINES - BROACHING MACHINES - METAL FORMING MACHINES - FLAME HARDENING MACHINES OPTICAL PROJECTION PROFILE GRINDERS - CUTTING FLUID

VAN NORMAN RAM-TYPE MILLERS



More work per man hour... that is exactly what you get in every one of the six basic models of Van Norman Ram-Type Millers. Your operators can turn out more and better work because they have so much less preliminary, error-charged fussing to do... because it is so much easier to set up these machines... and to control them when they are in operation.

Set-up time is saved by combining the adjustments of the cutterheads and rams to take successive cuts from horizontal to vertical milling. This means you get the greatest number of pieces per hour, produced with highest accuracy.

Control of Van Norman Ram-Type Millers

is simplified by grouping the operating levers right at the operator's fingertips. Accuracy is safeguarded by the massive, rigid construction ... especially in the large and heavy table, knee and saddle assemblies...by extra-heavy spindle transmission...and dials that are large enough to be plainly and easily read.

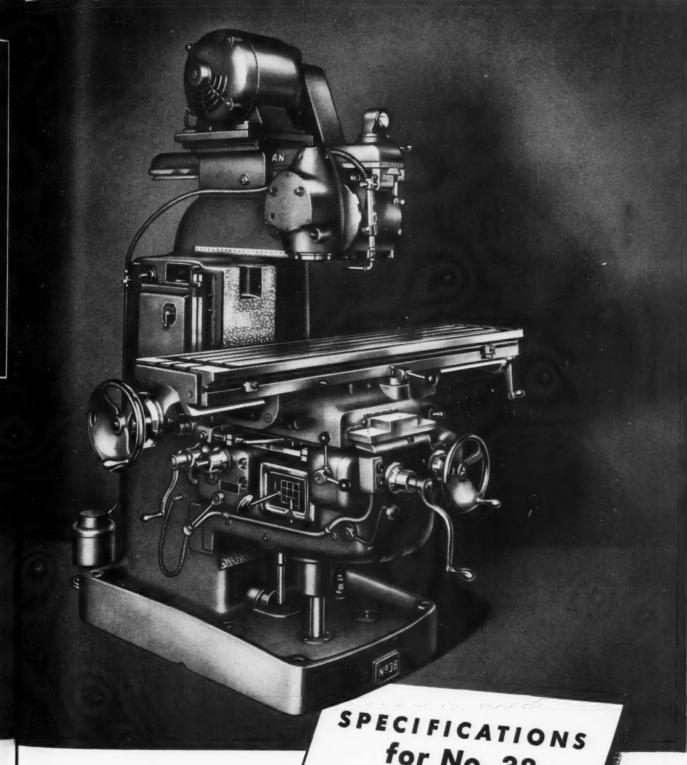
And remember, accuracy is underwritten in each machine by Van Norman's 61-year tradition of high-precision manufacturing ... by the full measure of quality in every mechanical feature, including weight and rigidity for smooth operation and heavy cuts.

That's why...when you buy Van Norman Ram-Type milling machines...you buy results.

VAN NORMAN

SPRINGFIELD





for No. 38

- Plain and Universal
- Table: 64" x 14"
- Range: 35" Longitudinal; 12" Cross;
- Spindle Drive Motor: 10 HP

LD,

MASSACHUSETTS,U.S.A

6 Ways to Cut Grinding Costs and Speed Production with Modern LANDIS CH Plain Grinders



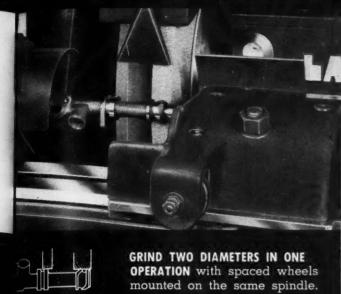


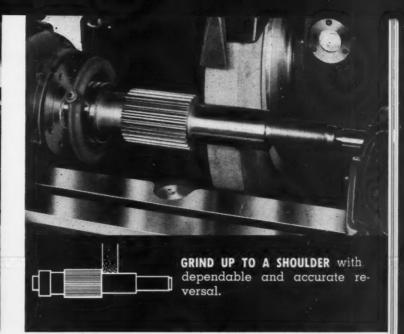
For full specifications write for new catalog B51

All of the latest advances in modern precision grinder design are included in this 6" x 30" Type CH Plain Grinder. Modern Landis grinders of this type provide answers to grinding problems of cost reduction and increased production. Send us prints of your work pieces for production estimates and tooling suggestions.

LANDIS

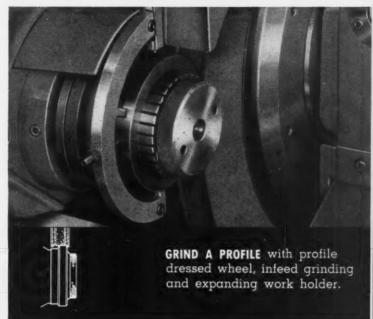
precision grinders

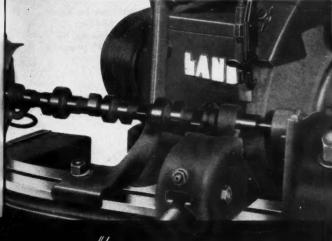


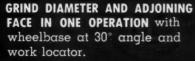




GRIND UNDER A PROJECTION with wheelbase set at 30 angle and special footstock center.



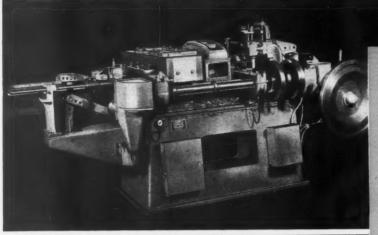


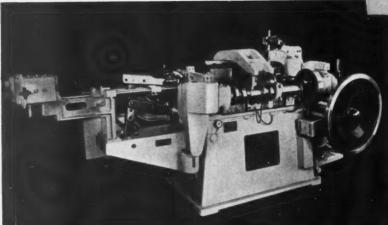


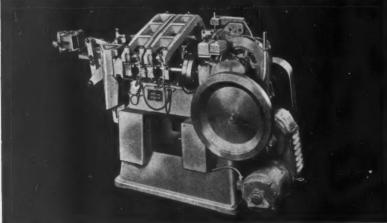


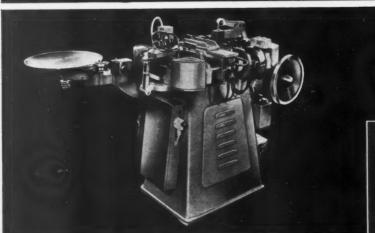
LANDIS TOOL COMPANY

WAYNESBORO, PENNA., U. S. A.











TOP TO BOTTOM

No. 35 U. S. MULTI-SLIDE

Maximum width of stock that can be handled, 3". Feed length obtainable, 12½".

Overall size of Machine, 57" high by 55" wide by 147" long. Net weight, 9560 pounds. Motor, 7½ HP.

No. 33 U. S. MULTI-SLIDE

Maximum width of stock that can be handled, 2½". Feed length obtainable, 12½". Overall size of Machine, 54" high by 49" wide by 120" long. Net weight, 5900 pounds. Motor, 5 HP.

No. 28 U. S. MULTI-SLIDE

Maximum width of stock that can be handled, $1\frac{1}{2}$ ". Feed length obtainable, 8". Overall size of Machine, 50" high by 38" wide by 80" long. Net weight, 2600 pounds. Motor, 2 HP.

No. 11 U. S. MULTI-SLIDE

Maximum width of stock that can be handled, 34". Feed length obtainable, 3". Overall size of Machine, 44" high by 40" wide by 66" long. Net weight, 1090 pounds. Motor, 11/2" HP.

These four machines are described in detail in Bulletin 15-M. Write for your copy.



Precision Formed Stampings Produced Complete with U. S. MULTI-SLIDES®

The formed stampings illustrated above are just a few of the many different types and sizes of parts that can be produced rapidly, accurately and efficiently in U. S. Multi-Slides.® There are four standard models of U. S. Multi-Slide Machines for producing parts ranging in size up to 3" in width. Specifications of these machines are given at the left.

Produce Parts Complete - Reduce Costs - Increase Production

One of the outstanding features of these machines is their ability to produce, complete at each stroke, parts which would ordinarily require secondary operations and handlings if produced on conventional presses. Because formed stampings are produced uniformly and to close tolerances with U. S. Multi-Slides, quality is improved and yet the number of necessary inspections is reduced.

Get Greater Versatility

The various movements obtainable on U. S. Multi-Slides are provided by units which are part of the machine equipment, and do not have to be built into the tools. Tools for any one size of U. S. Multi-Slide can be used with any other U. S. Multi-Slide of the same size.

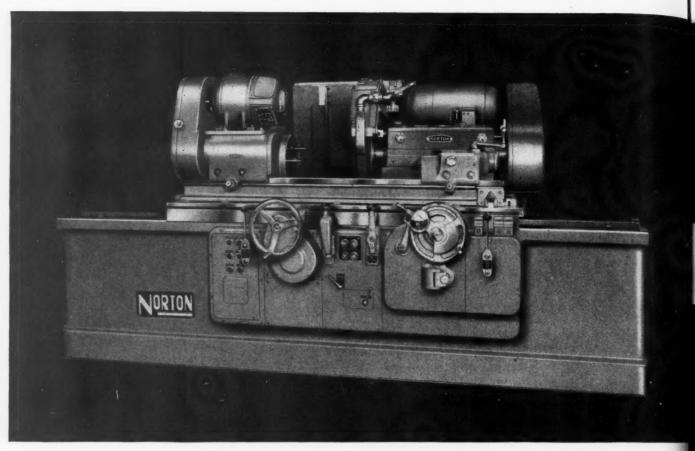
If your production involves piercing, trimming, embossing, swaging, stamping, forming and similar operations, write for a copy of Bulletin 15-M, which gives complete specifications of all four U. S. Multi-Slides.

R Trade Mark Registered, U. S. Patent Office

COMPANY, Inc. AMPERE (East Orange) NEW JERSEY

Builders of U.S. Multi-Slides-U.S. Multi-Millers

U. S. Automatic Press Room Equipment—U. S. Die Sets and Accessories



NORTON 10" TYPE CTU Semiautomatic Grinder is first choice on production lines and in job shops. No other cylindrical grinder offers you such a unique combination of speed, accuracy, flexibility and sturdiness. No wonder users have reported that Norton 10" CTU's have doubled production . . . replaced 2 or 3 machines

... eliminated extra operations ... made operators more productive. Catalog No. 1787 gives you complete data about sizes, advantages, features and optional equipment that help you put extra profits into your production. It will pay you to look into the high-speed, high-finish grinding this machine makes possible.

CTI

You get better and faster cylindrical

with Norton Type CTU Semiautomatics

Heavy stock removal? Consistently fine finishes?

You get either or both . . . easier and faster . . . with a Norton CTU Semi-automatic Cylindrical Grinder.

It's easy to see why. Your operator loads the work...touches one lever... and stands by while the machine does the rest... as easy as 1-2-3.

Work is automatically ground to size under electric timer control ... and the wheel head resets itself for the next cycle.

All three basic Norton CTU Semiautomatic Grinders: 4", 6", and 10", offer you the same advantages over their different ranges of work sizes. You can also get the 6" grinder with a 10" swing and the 10" grinder with a 14" swing by specifying Type LCTU. The Norton line of Type CTU Cylindrical Grinders also includes plain machines for traverse grinding. Your Norton Representative will be glad to help you choose the one that best fits your requirements.

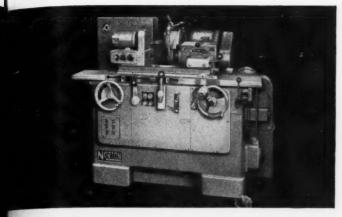
Norton Cylindrical Grinding Machines are just one phase of the world's most complete line of grinders and lappers ... products of Norton's engineering leadership in both grinding wheels and

machines.

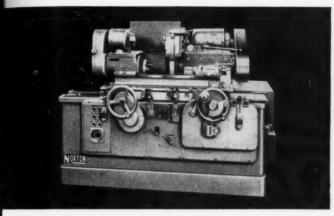
Remember — only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost.

Norton welcomes opportunities to work with you on the planning level to fit standard or special grinding machines into your plans for "post emergency" production.

For complete information, see your Norton Representative or write us direct for the catalogs listed under the machine illustrations. NORTON COMPANY, Machine Division, Worcester 6, Mass.



work length capacities now makes it practical for you to apply Type CTU high-speed, high-finish grinding to small parts. Catalog No. 531 gives you full details. NEW NORTON 4" TYPE CTU Semiautomatic Grinder in 12" and 18"



NORTON 6" TYPE CTU Semiautomatic Grinder, in 18" and 30" work length capacities, has a performance record that's worth investigating. Catalog 1488 tells the whole interesting story.

grinding

To Economize Modernize With NEW



GRINDERS and LAPPERS

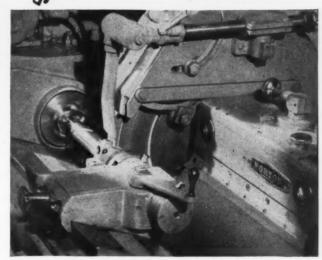
Making better products to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

EASY AS 1-2-3



Operator loads machine and touches starting lever.



Machine automatically grinds part to required size and finish — while operator attends another machine.



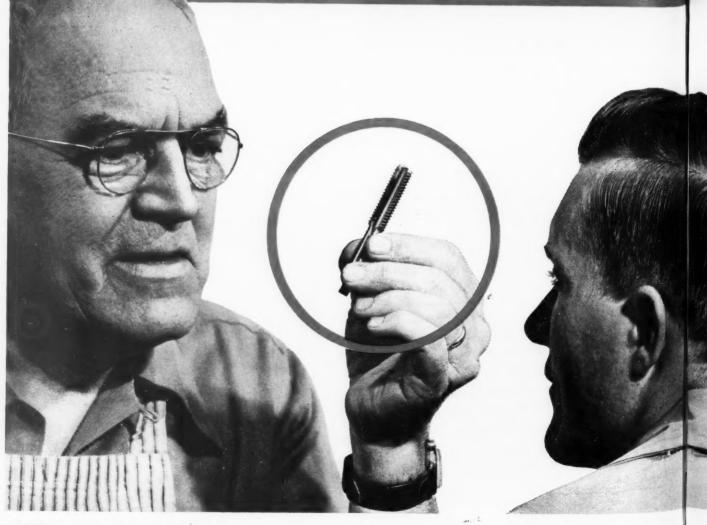
Operator unloads machine.

"MORSE TAPS are TOPS

to begin with...and

Electrolizing makes 'em last

even longer!"





From foreman to apprentice, for generations, the word on Morse Quality has been passed along unchanged: Morse has always made the taps that deliver top performance. For the regular job, you have Morse Straight-Fluted Taps. For stringy ferrous metals, you have Morse Spiral Pointed Taps that push the chips ahead and out. Then for non-ferrous metals, you have Morse Spiral-Fluted Taps that draw out the chips in a smooth flow. And they come in fractional or machine screw sizes, with one or more chamfers.

And now... if you want even more service-life, specify Morse Electrolized Taps. Get your Morse-Franchised Distributor to give you the benefit of his wide knowledge of tapping operations, and his complete Morse stock, to help you beat every tapping job in your plant... at a lower cost level than you've ever known before.

(Watch these pages for some tap news of headline interest . . . coming up soon!)

MORSE TWIST DRILL & MACHINE COMPANY, NEW BEDFORD, MASS.

(Division of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco

MORSE Cutting Tools

... buy them by phone from your Morse-Franchised Distributor and save ordering time

MACHINERY, August, 1952-17

Tolerances held t

ON 3,000 LB. ALUMINUM



Final machine finishing on upper component of large helicopter rotor hub on a G&L 350-T

GIDDINGS & LEWIS



Floor Type Horizontal Boring Machine

Planer Type Horizantal Boring Machine Hypro Open-Side Planer sin

G

18-Machinery, August, 1952

to .0007 in.

IT takes a versatile tool to machine a 3000 lb. aluminum alloy forging down to a finished weight of 250 lb. — especially when many of the dimensions must be held to a tolerance of .0007-in.

But Magna Mill Products, South Gate, Calif., was ready when orders came to produce the lower components of a huge rotor hub to be used on the largest helicopter ever designed. Three Giddings & Lewis 350-T Horizontal, Boring and Drilling Machines did the rough and finish machining after a band saw had removed excess metal. These G&L's handle awkward machine workpieces like the rotor hub components — and at the same time perform the most precise machine operations.

It is this kind of versatility and precision — on big or little jobs, simple or complex — that saves time and money for users of G&L Horizontal Boring, Drilling and Milling machines.

But whatever you need, don't miss the opportunity to get a free G&L 5-Point Job Analysis. There is no obligation — and DELIVERY ON G&L MACHINES MIGHT BE BETTER THAN YOU THINK!



Two views of the lower component of the helicopter's rotor hub after production had been completed. The aluminum alloy forging for this part weighed 3000 lb. while the finished part weighed approximately 250 lb. Note the complexity of the part, in which many of the dimensions must be held to a tolerance of .0007 in.

G&L 5-POINT JOB ANALYSIS

takes the guesswork out of machine tool buying..works for you and with you to solve big or complex machining problems..increases production ..reduces machining costs

- COMPLETE STUDY OF YOUR JOB OR JOBS

 G&L Job Analysis Engineers, working with your engineers, analyze your requirements by:

 (1) number and size of parts to be produced,
 (2) number and kind of operations needed,
 (3) tolerances and finishes required.
- DETERMINE MOST EFFICIENT MACHINING METHOD Taking into consideration the individual machining requirements of the job, G&L Job Analysis Engineers choose the most efficient machining method. G&L engineers can give an unbiased opinion because G&L builds a complete line of sizes and types of planers, planer-millers, vertical boring and turning milts and horizontal boring, drilling and milling machines . . . plus a complete line of accessories and tooling for these machines.
- SELECT THE SIZE, KIND AND TYPE OF MACHINE—The machining method now determined, G&L Job Analysis Engineers using your production and work requirements recommend the exact size, kind and type of machine that will do the job most efficiently.
- PLAN YOUR OPERATIONS After the selection of the most efficient machine to fit your needs, G&L Job Analysis Engineers plan a sequence of operations that will (1) minimize number of setups and setup time, (2) use modern cutting tools to best advantage, (3) take full advantage of the machine working ranges and capacities, (4) keep operator fatigue to a minimum.
- THE TOOLS TO USE—If conditions warrant, G&L will recommend the standard machine accessories, arrangements and tools you can use to make your equipment more productive—more versatile in application. If special equipment is needed, it will be designed to agreed specifications and made a part of your order.

Write, wire or phone GaL or its nearest representative today. Get the facts on your needs—your problems. Get a GaL unbiased Job Analysis to help you. Don't hesitate—there's no obligation...AND DELIVERY MAY BE BETTER THAN YOU THINK!

How to get a G&L job analysis

Call your nearest G&L dealer or write us direct. Furnish our Job Analysis Engineers with blueprints, job data, and production requirements. Factory engineers will completely analyze your machining problems. There's no charge, no obligation. Don't hesitate — do it today.

Hypro Planer Type Milling Housing Planer Housing Planer Turning Mill T



LITTLE TAPS

FOR Big JOBS

You get more work and better size control when using WINTER Balanced Action Machine Screw Taps. These little taps do big jobs.

WINTER BROTHERS COMPANY Rochester, Michigan, U.S.A.

Distributors in principal cities. Branches in New York, Detroit, Chicago, Dallas, San Francisco. Division of National Twist Drill & Tool Company.

ALWAYS AT YOUR SERVICE

Your local Industrial Supply Distributor carries a complete stock of WINTER Taps.



Conomize WITH NATIONAL HOBS

For over-all economy in hobbing gears and similar parts, buy NATIONAL Hobs. They give you accuracy, fast production and more parts between sharpenings.

NATIONAL TWIST DRILL & TOOL COMPANY Rochester, Michigan, U.S. A.

> Distributors in principal cities. Factory Branches: New York, Chicago, Cleveland, Detroit, Dallas, San Francisco.



THIN BRIDE

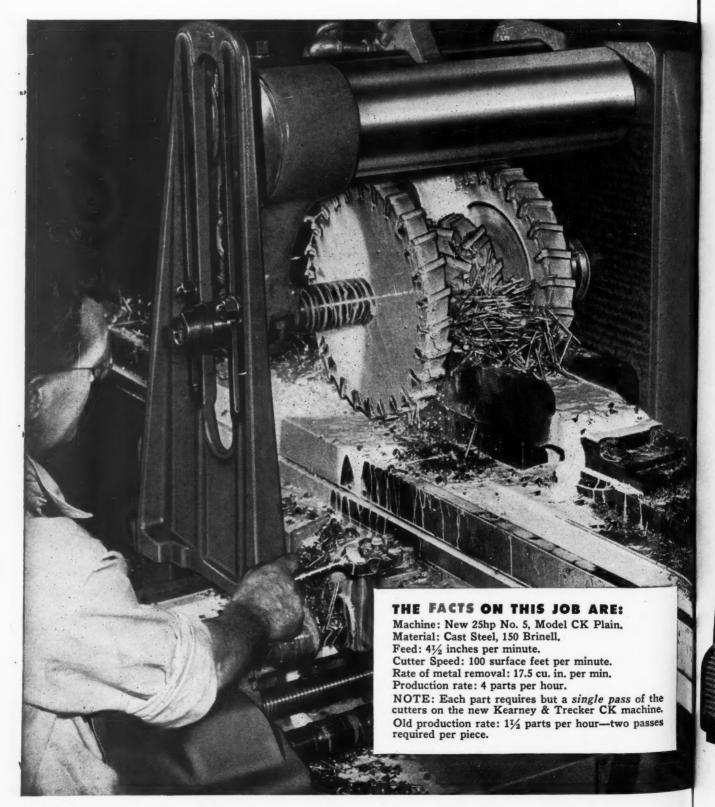
CALL YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

... for all your staple industrial needs, including NATIONAL Twist Drills, Reamers, Counterbores, Milling Cutters, End Mills, Hobs, and special tools.



facts tell the story

NEW KEARNETSTRECKER K USER BIG



MILLING MACHINE PAYS PRODUCTION DIVIDEND

NEW 25HP CK PLAIN MACHINE OUT PRODUCES PREVIOUS MACHINE NEARLY 4 TO 1!

CK MILLING MACHINE FEATURES THAT HELPED DO THIS JOB BETTER



Greater rigidity of new CK column easily absorbed vibration from heavy cutting load. Only single pass needed for each part.



CK's 3-bearing spindle and fly-wheel assure Maximum Cutter Efficiency. On this job it meant fast metal removal and smooth finish in a single pass.



New CK machines have Greater Horsepower. On this job, 25hp enabled operator to get maximum production from his cutters.



No. 60 heavy-duty drive flange around spindle nose permitted use of an extra-rigid heavy-duty arbor on this multiple cutter setup.







The new Kearney & Trecker CK milling machine doing this job has 24 different spindle speeds (13 to 1300 rpm.) Its 32 different table feeds range from 3/6" to 90" per minute. Thus operator was able to pick exact speed and feed to get fullest advantage from high horsepower and modern cutting tools. This meant Greater Productivity on this job.



Smoother Feed of CK's large (2" dia.) screw and extra-long table feed nut with backlash eliminator permitted heavy cut.



CK's positive, metered pressure and automatic lubrication assured cool, wear-free operation in spite of heavy cutting load.

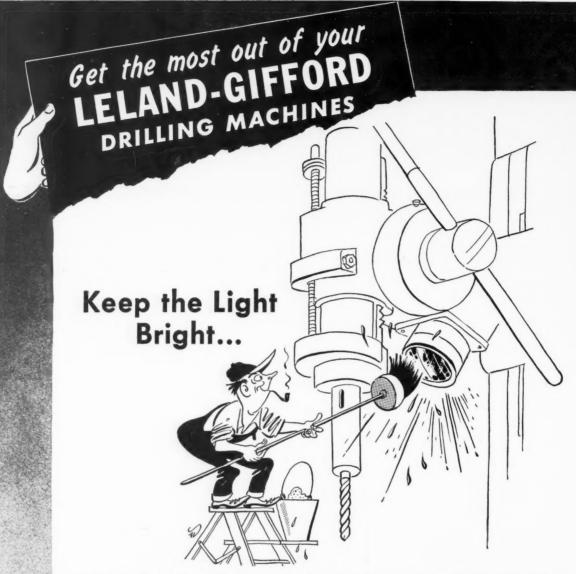


New No. 4 Model CK

25hp Plain



Investigate the new CK line of milling machines. You'll find every feature is test and job-proven to give you costcutting results . . . greater machine capacity, productivity



The built-in light on the sliding head of every Leland-Gifford Drilling Machine is there for a purpose. It clearly illuminates the table and the work . . . helps you drill more holes with greater accuracy and safety. Frequent cleaning of the lamp lens with a soft cloth will insure maximum light and better performance from your Leland-Gifford Drilling Machines.

A small point? Yes...but important! Leland-Gifford Drilling Machines are built as trouble-free as master craftsmanship and long experience can make them ...with totally enclosed motors, spline lubrication wipers, oil mist lubricated spindle bearings and many other features to insure lasting precision and safe, dependable operation. But neglect or abuse

can impair the performance of even the finest equipment. With reasonable care and maintenance, your Leland-Gifford Drilling Machines will keep on producing accurate holes year after year. Remember, you are making a valuable contribution to the defense effort when you take the best possible care of your production equipment.

SAVE TIME - CONTACT THE OFFICE NEAREST YOU

LELAND-GIFFORD

Drilling Machines

WORCESTER 1, MASSACHUSETTS, U.S.A.





Flatness Problem Solved .Valve Plate Output **Increased 4 Times**

TWO surfaces parallel ground in ONE operation.

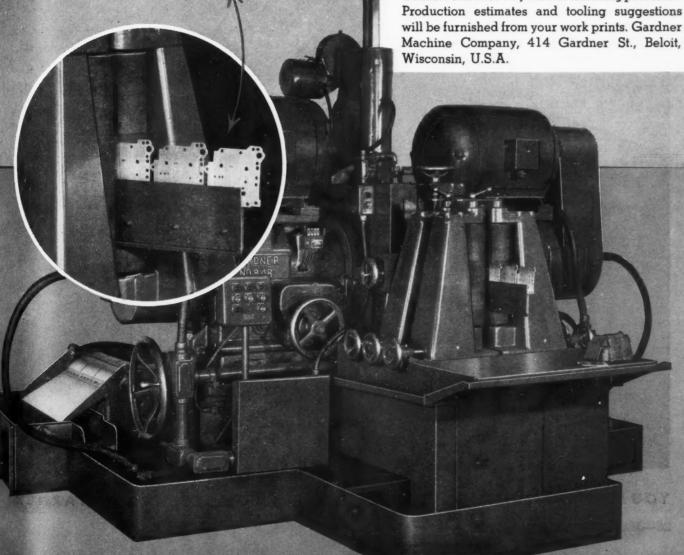
An automotive parts manufacturer had trouble meeting the required tolerances for flatness while grinding valve plates by another method. With a new Gardner 84B double disc grinder the tolerances were met and production was increased from 300 to 1200 pieces per hour, with the same manpower.

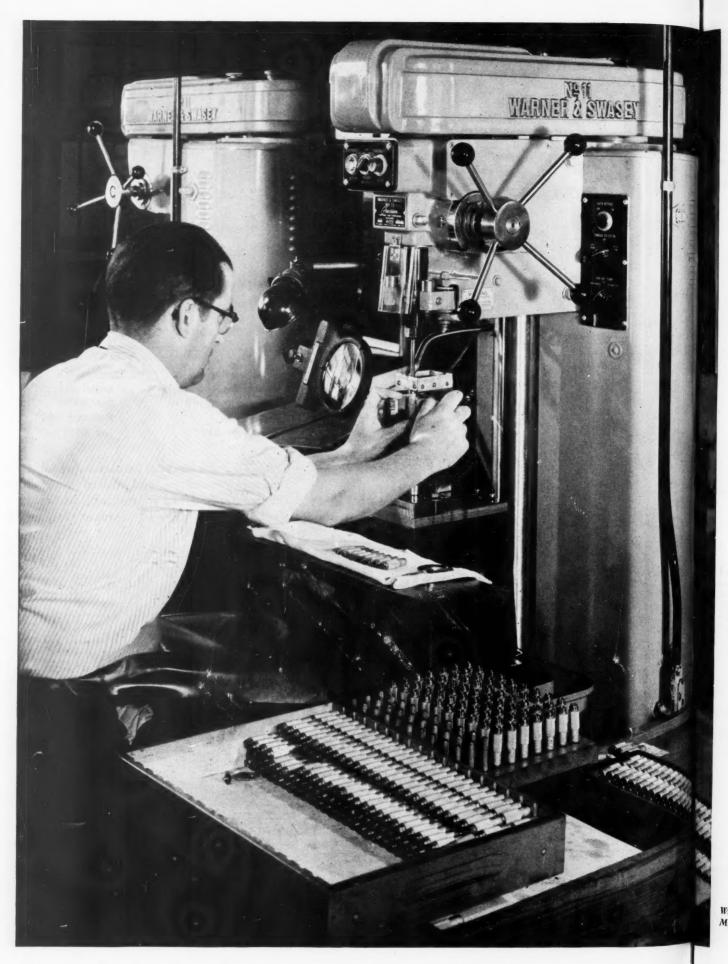
Part: Valve Plate Material: Hardened Steel Number of Passes: 3 Overall Stock Removal: .043"

Tolerances: Uniformity: .003 " Parallelism: .0015"

Flatness: .001" to .0015"

Consult Gardner on your flat surfacing problems. Wisconsin, U.S.A.





YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER

26-Machinery, August, 1952

All Lufkin Chrome-Clad Micrometers now tapped on Warner & Swasey Tapping Machines



THE NAME, LUFKIN, has long been associated with extreme accuracy by users of precision measuring instruments. However, many manhours of selective assembly were required to assure such accuracy in Lufkin Micrometers—until Warner & Swasey helped simplify and speed up their production.

Now Warner & Swasey No. 11 Precision Tapping and Threading Machines tap the high precision threads necessary in the hub and in the thimble of the micrometer. They perform each of these tapping operations in one pass, where three were previously required. And Warner & Swasey's positive lead screw principle maintains an accurate and constant lead control in these threads. No longer must an operator "feel" his way into the work by hand, or risk

damage to the finished threads on withdrawal.

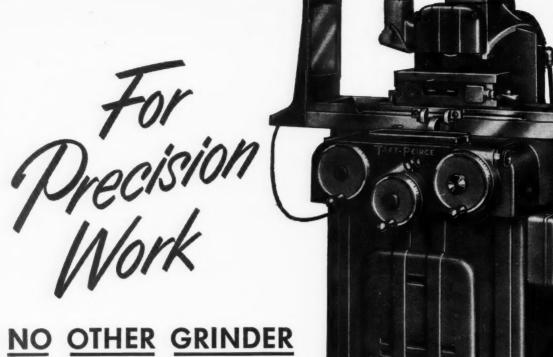
But of particular importance to Lufkin, operators can now qualify the starting positions of the taps so the "zero" mark on the micrometer's thimble matches perfectly with the reading lines on the hub when assembled. This drastically reduces the time-consuming selective and individual fitting of thimble to hub formerly necessary.

Where your work requires extreme threading accuracy on a production scale, call in your nearest Warner & Swasey Field Representative. He'll explain the many unique features of the

No. 11 Precision Tapping and Threading Machine, and show you how it can improve your tapping operations.



Warner & Swasey No. 11 Precision Tapping and Threading Machine in use at Lufkin Rule Company, Saginaw, Michigan.



CAN MATCH

A TAFT-PEIRCE #1 Surface Grinder

Machine illustrated is equipped with vernier attachments for horizontal and vertical settings to .0001".

This Taft-Peirce #1 Surface Grinder produces surfaces with an accuracy, flatness, and finish formerly considered difficult or impossible. Originally designed and built for our own shop, it's the finest yet devised.

Full ball bearing construction minimizes friction...provides extreme precision with almost effortless operation. So smooth that users report finer finishes, less operator

Another exclusive feature—the tilting

wheelhead simplifies setups, speeds difficult angle and shoulder work.

Compact, yet heavier and sturdier than other machines, the Taft-Peirce #1 Surface Grinder maintains its accuracy over many years of rugged service. Little or no maintenance is required. For more information write today.

fatigue, and sharply reduced wheel wear. THE TAFT-PEIRCE MANUFACTURING COMPANY WOONSOCKET, RHODE ISLAND

T-P means TOP PRECISION



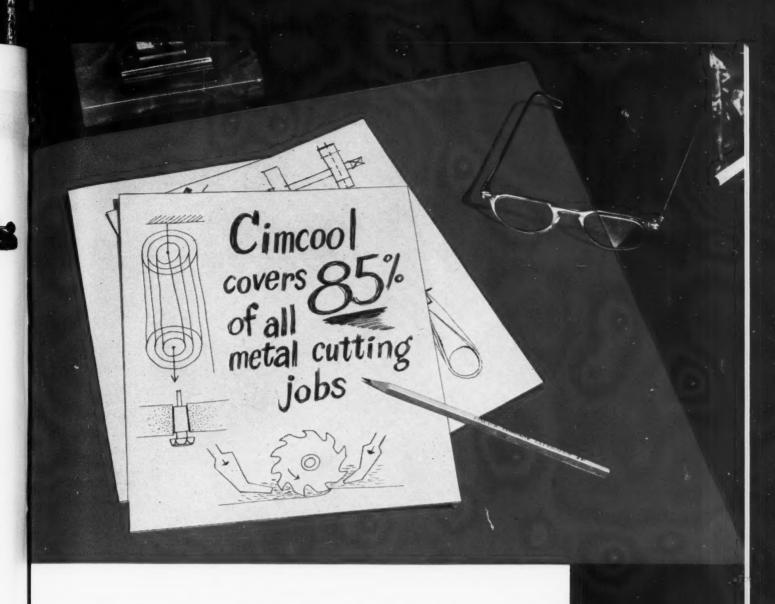
For ersatile Air Gages







For Contract Service; Design and Manufacture of Tools, Dies, Jigs, Fixtures, and Complete Machinet



Worth Thinking Over

AND WORTH SWITCHING OVER to Cimcool^o for this radically new and different cutting fluid also lowers costs ... permits faster speeds ... increases accuracy ... helps increase tool life.

Cimcool is superior to old-fashioned coolants because it is a chemical emulsion. It replaces all water emulsions and all but a few highly compounded specialty oils. Cimcool permits faster speeds and increases tool life because it combines friction reduction and cooling capacity in a degree never before attained.

It's longer lasting in machines. So Cimcool reduces downtime and cuts labor costs for cleaning and changing.

For a demonstration in one of your own machines, just write us and we'll have one of our Cincinnati Millingtrained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "CIMCOOL Defeats Heat." Address Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

A Production-Proved

Product of

THE CINCINNATI MILLING

MACHINE CO.

^oTrade Mark Reg. U.S. Pat. Off.

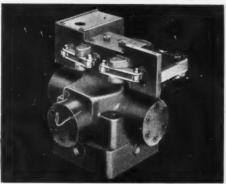




30-Machinery, August, 1952



UNBRAKO CAP SCREWS



PRECISION FINISH ADDS SALES APPEAL TO YOUR PRODUCT

Every spring, washer, nut and bolt is equally important to your product, but it's the finish that attracts attention, arouses interest, and creates a desire for it.

SPS makes its products to help you sell your products. Our threaded industrial fasteners—UNBRAKO Socket Screw Products—have the clean precision finish to give your product added eye appeal; the uniform accuracy and strength to give it added sales appeal.

appeal; the uniform accuracy and strength to give it added sales appeal.

Take advantage of SPS Fastener Engineering. Let the experience and know-how of more than 40 years help you sell your product. STANDARD PRESSED STEEL Co., Jenkintown 19, Pennsylvania.

UNBRAKO

SOCKET SCREW DIVISION



CAP SCREWS • SET SCREWS • SHOULDER SCREWS • DOWEL PINS • PRESSURE PLUGS



for long, dependable service...

Torrington Needle Bearings have set outstanding service records in countless applications throughout industry. The reason is simple. Needle Bearings are made to last. The one-piece shell which serves as the outer raceway is accurately drawn from carefully selected strip steel. After forming, it is carburized and hardened, with no further grinding that might destroy the wear-resistant raceway surfaces. The precision-ground rollers are thru-hardened for long life.

Because of this careful selection of materials and precision workmanship to close tolerances, Torrington Needle Bearings provide accurate, dependable performance in the most rugged applications. Ask our engineering department to help you determine how you can use Needle Bearings to advantage in *your* product.

THE TORRINGTON COMPANY
Torrington, Conn. South Bend 21, Ind.

District Offices and Distributors in Principal
Cities of United States and Canada



pos tipl

whe

the

"Hy

Hy

rese

pov

spe

qua

T

TORRINGTON NEEDLE BEARINGS

Needle • Spherical Roller • Tapered Roller • Straight Roller • Ball • Needle Rollers

One Dozen Holes in Perfect Alignment

with HANNIFIN "HY-POWER" HYDRAULICS



This "Hy-Power" machine punches 12 precision holes at once. Like this. The wheel and spider are placed in position and raised. Twelve "Hy-Power" Cylinders, operating in multiple, punch the holes. The assemblies then pass along a short conveyor where the rivets are "stuck," and a similar "Hy-Power" unit squeezes the 12 rivets . . . again in a single operation.

This is just another example of how tool engineers are using Hannisin "Hy-Power" Hydraulics in machines they design. The "Hy-Power" Hydraulic Generator, a compact unit including motor, pump, oil reservoir, control valves and high pressure intensifier . . . supplies the power. Then 12 "Hy-Power" Cylinders exert the force.

What does this suggest to you?

Whether you need a one-of-a-kind special or machines to be built in quantity for resale, it will pay you to explore the possibilities of Hannifin "Hy-Power" Hydraulics. For here is equipment that permits you to apply forces up to 100 tons . . . in any direction . . . simultaneously. A Hannifin Field Engineer will explain how you can utilize this modern equipment for punching, riveting, staking, bending or crimping operations. Hannifin Corporation, 1109 S. Kilbourn Ave.,

Chicago 24, Ill.

HOW KELSEY-HAYES IMPROVED QUALITY AND PRODUCTION. MINIMIZED RUNOUT OF WHEELS FOR AUTOMOBILES

On Kelsey-Hayes production lines, there are numerous units like the one shown. Each consists of a "Hy-Power" Hydraulic Generator and twelve 12½-ton "Hy-Power" Cylinders carried in spring-mounted yokes. Limit switches control the circuit, preventing operation until work is in position. High pressure hose lines are sheathed with armored cable.

In addition to speeding output, these "Hy-Power" units have reduced wheel "runout" to an absolute minimum.

Write for Bulletin 150

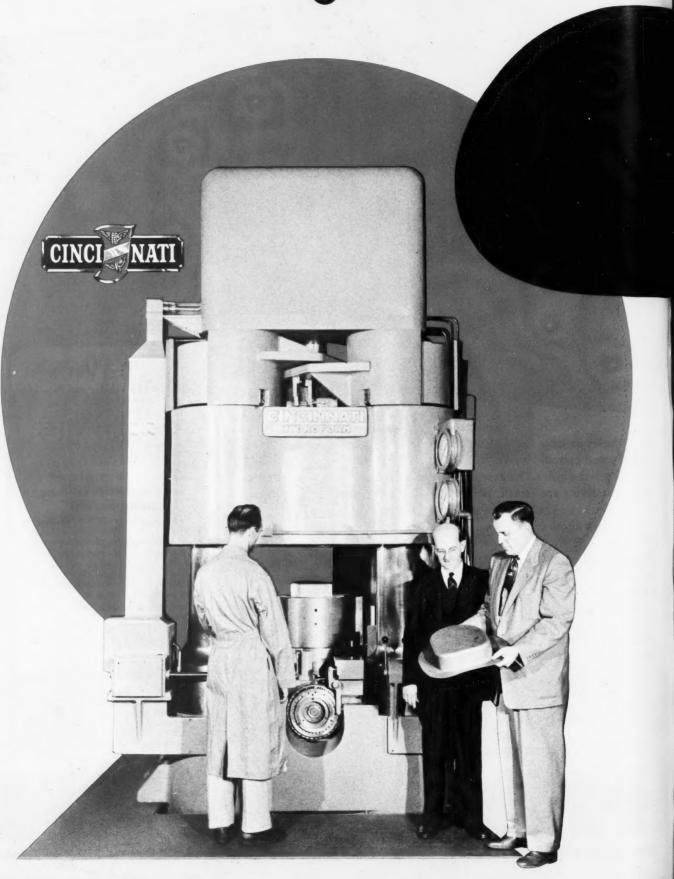
The complete story of Hannifin "Hy-Power" Hydraulics. Your copy sent on request



do ALL you can do . . . with

Air and Hydraulic Cylinders • Hydraulic Presses • Pneumatic Presses • "Hy-Power" Hydraulics • Air Control Valves

A revolutionary new metal forming machine tool



NEW CINCINNATI 26" HYDROFORM

Built in 12", 19", 23", 26", 32" sizes.

HE NEW CINCINNATI LYGGOTOGIAN PROPERTY OF THE PROPERTY OF THE

A product of THE CINCINNATI MILLING MACHINE CO.

This is an entirely new metal forming machine tool utilizing a new deep drawing principle... *Hydroforming*. It will change your thinking on deep drawing and forming!

Practically any shape can be formed from a wide range of materials up to $\frac{3}{8}$ " thick.

Hydroforming produces deep drawn parts in fewer operations... many parts are produced in a single operation.

Only simple, inexpensive tooling is required . . . a draw ring and male punch.

Part quality is improved . . . surface finish is unimpaired.

Investigate Hydroforming now!





FULL DETAILS NOW AVAILABLE

New Hydroform Bulletin No. M-1759 is now available. It gives a complete description of the Hydroform process; illustrates a variety of Hydroformed parts, and gives detailed machine specifications. Your free copy will be mailed promptly on request.

THE CINCINNATI MILLING MACHINE CO.



Equip with ARMSTRONG TOOL HOLDERS for Defense production

A change over to new products, starts in the tool room and the die shop . . . starts with ARMSTRONG TOOL HOLDERS. In preparing for defense orders, the logical first step is to check your stock of ARMSTRONG TOOL HOLDERS. With the correct types for every operation, and the correct sizes for each lathe, planer, slotter and shaper, you will be able to start work on a moments notice.

ARMSTRONG TOOL HOLDERS reduce "tooling-up" to the selection of a cutter and tightening of a set screw. They permit oper-

ation at higher speeds, and heavier feeds than are customary—they enable you to produce more pieces per hour, per man, per machine. Produced by modern methods, in a speci-

Produced by modern methods, in a specially-built tool plant, they are the lowest cost tooling you can buy. And, they are as available as your telephone for they are carried in stock by your local supply house.

stock by your local supply house.

Use ARMSTRONG TOOL HOLDERS
wherever possible for lower tool cost, saving
in High Speed Steel, increased output and

greater profit. Write for Catalog



ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"
5213 W. ARMSTRONG AVENUE CHICAGO 30, ILL.



Use WELDED STEEL
for Greater Strength
with Less Weight!



parts produced by Mahon for the defense production program. It, and the Steel-Weld Fabricated parts and assemblies illustrated at the left, are typical of thousands of units Steel-Weld fabricated and machined by the Mahon Company for manufacturers throughout the country. Do you have parts or assemblies in your product that could be redesigned for more economical production in welded steel? . . . do you have products in the development stage in which Steel-Weld fabricated parts could reduce weight without sacrificing strength? . . . are you faced with limited production on an item involving heavy pieces in which pattern costs are a consideration? If so, it will pay you to familiarize yourself with Mahon facilities and technical services . . . you will find in the Mahon organization a unique source with complete, modern fabricating, machining and handling equipment to cope with any type of work regardless of size or weight . . . a source where skillful designing and advanced fabricating technique are supplemented by craftsmanship which assures you a smoother, finer appearing job, embodying every advantage of Steel-Weld Fabrication.

THE R. C. MAHON COMPANY DETROIT 34, MICHIGAN

Engineers and Fabricators of Steel in Any Form for Any Purpose

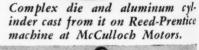
MAHON

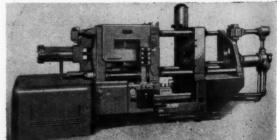


of one of the world's largest magnesium die casting departments.

Operating round-the-clock to meet production schedules, the reliable and rugged Reed-Prentice Die Casters produce a variety of die castings for McCulloch Motors' lightweight engines and portable pumps.

If you want to produce higher quality aluminum and magnesium die castings, look to Reed-Prentice Models 11/2G and 2G cold chamber machines that provide plunger speed up to 10,000 inches per minute through a new "prefill" arrangement. Write today for full particulars.





Reed-Prentice No. 2G Die Caster with special "prefill" arrangement.

REPRESENTATIVES:

Grand Rapids .. Joseph Monahan Co. Syracuse J. F. Owens Machinery Co. Houston Preston Machine Tool Sales Co. Seattle & Spokane Star Machinery Co. Minneapolis Chas. W. Stone Co. Los Angeles Western Molders Supply Co.



MAIN OFFICE 677 Cambridge St., Worcester 4, Mass.

BRANCH OFFICES

75 West St., New York 6, N. Y. 1213 West 3rd St., Cleveland 13, Ohio 4001 N. Elston Ave., Chicago, Illinois 2842 W. Grand Blvd., Detroit 2, Mich.



ntice

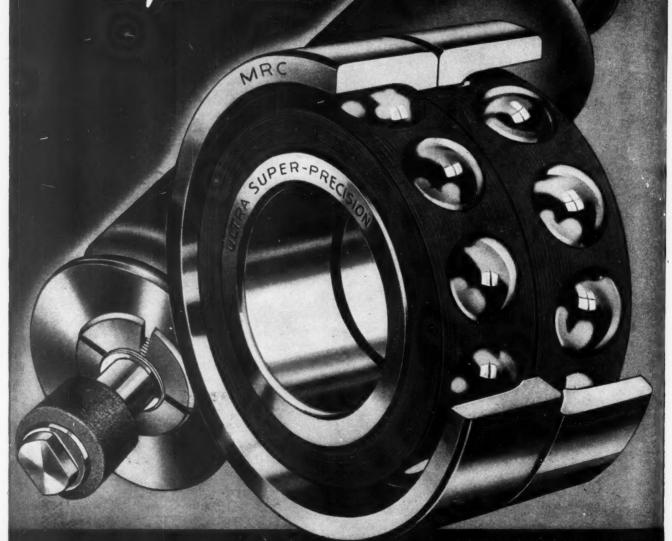
with

Moss. N. Y.

Illinois

M-R-C ULTRA SUPER-PRECISION BEARINGS

For High-Speed Spindles



MARLIN-ROCKWELL CORPORATION Jamestown, N.Y.



Cut the costly excess . . . with Pure Oil Industrial Lubricants

In the complete line of high-quality industrial lubricants Pure Oil makes, you will find many oils and greases designed to do several *different* jobs, instead of one specific job.

And to do each job equally well.

This makes it possible for you to do *all* your lubricating with *fewer* lubricants. In other words you can



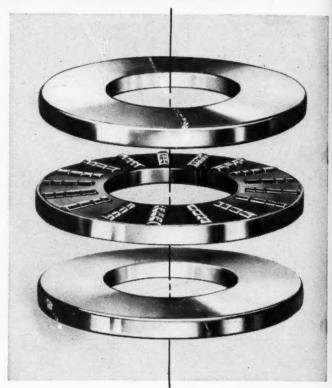
simplify and save...with Pure Oil Industrial Lubricants

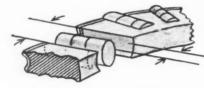
If reducing your lubricants inventory would help reduce your costs (and don't you think it should?), write for full details to: The Pure Oil Company, Industrial Sales, 35 East Wacker Drive, Chicago 1, Illinois.

True Line Contact

reduces unit pressures; increases maximum capacity

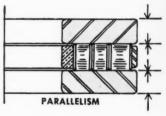
Heat-treated to insure uniform hardness and surface structure, both the solidcylindrical rollers and the thrust plates of Rollway Thrust Bearings are held to extremely close limits of parallelism. The result is a true line contact that reduces unit pressures, increases maximum capacity and affords a wide margin of safety for overloading shock or vibration.





PARALLELISM

Accurate parallelism between the rollers and the matched thrust plates is repeated in the parallelism between the separator slots and the rollers themselves—all adding up to quietness, equalized wear and longer life.



FO

Rollway Thrust Bearings offer the widest selection in types and sizes, available for quick replacement through AUTHORIZED DISTRIBUTORS. See your classified 'phone directory for name.

Our engineers are available without cost or obligation to assist you in selecting the correct Rollway Bearing for your needs. 'Phone your nearest Rollway sales office.

Rollway Bearing Company, Inc., Syracuse 4, N. Y.

SALES OFFICES

Philadelphia Pittsburgh Houston Detroit

Syracuse

Los Angeles Cleveland Chicago Boston Toronto

ROLLWAY BEARINGS

Complete Line of Radial and Thrust Cylindrical Roller Bearings

FEED AND SPEED CHANGE-LIGHTNING-QUICK!



Part-Clamp Post; Material—X-1315 Steel; Preselected Spindle Speeds— 5; Cuts required—10; Time per piece—40 seconds; Setup Time—35 minutes.

SPEEDI-MATIC FEATURES

- Automatic electronic speed change, preselected for as many as nine stations.
- Automatic electronic feed change, preselected for as many as six stations.
- Infinitely variable range of spindle speeds—40 to 4000 rpm.
- spindle speeds—40 to 4000 rpm.

 Feeds from 1/8" to 16" per minute.
- Quick-acting, spring-return, hand-operated cut-off slide.
- Air-fed pusher-type collet attachment.
- Collet chuck capacity-1/8".

PRESELECT Any 9 Spindle Speeds...40-4000 rpm AND PRODUCE!

For peak screw machine production, take a good look at the Monarch Speedi-Matic. This electronically-controlled lathe, with instant preselected speed and feed changes in a wide stepless range, saves as much as 50% on production times. Add its average 45 minute setup time—without feed cams, and you see why it has proved unbeatable in runs of 25 to 2000 or more pieces.

The preselected speed and feed settings can be made for all six turret stations; the preselected speed settings for cross feed slide operations. Being wide in range and infinitely variable, they provide better finishes and closer tolerances—toolroom accuracy at production line speeds.

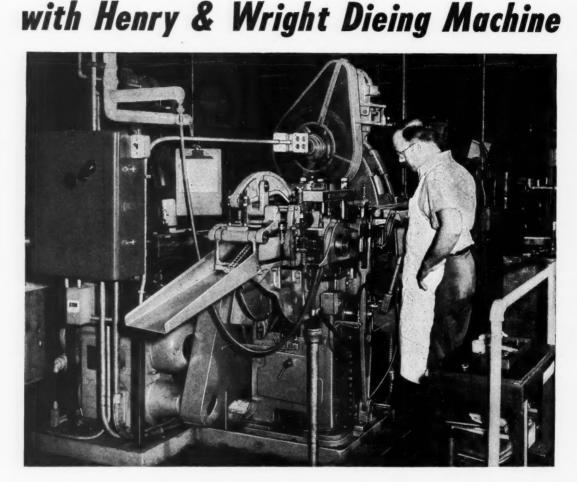
The Speedi-Matic, to repeat, stands for speed—with Monarch standards. It has won a name in metal-working circles as "The world's fastest hand screw machine." And we've got performance records and job data to back up that name—all neatly presented, with specifications and complete information, in our illustrated Booklet No. 1903. For this booklet—or information on other Monarch turning equipment—simply write us on your letterhead . . . The Monarch Machine Tool Co., Sidney, Ohio.

onarch

TURNING MACHINES

FOR A GOOD TURN FASTER ... TURN TO MONARCH

Sperry Boosts Rotor Lamination Production 367%



In Many of the Devices manufactured by Sperry Gyroscope Company, a division of the Sperry Corporation, rotors are important components. Speed of production is essential, but so is accuracy. Sperry's rotors are smaller than industrial types and the laminations must be held to closer tolerances.

Normal production of laminations was 750,000 per month, using conventional overhead crankshaft presses. With the Henry & Wright Dieing Machine, production zoomed up to an average of 3,500,000 laminations per month, an increase of about 367%. In addition, die life has been lengthened and more pieces are produced between grinds.

Only the best is good enough



FACT PACKED CATALOG

Complete descriptions of all Henry & Wright Dieing Machines. Write: Henry & Wright, 462 Windsor St., Hartford 5, Conn.



HENRY & WRIGHT



Heing of fra Hy end Srah unit end in The Hy pla and To rah one floor with half bid direction open from the transfer of the tra

Production Pointers from GISHOLT



TIME-SAVING IDEAS

Presented as a service to machine shops, we hope some of these interesting ideas, culled from thousands of jobs, will suggest ways to help you cut time and costs in your own metal work.

HOW TO DO FAST, ACCURATE MACHINING OF MOTOR FRAMES

No. 12 Hydraulic Handles Variety of Sizes

Here is an excellent setup for machining electric motor frames in a variety of sizes ranging from 630 to 204 frames. The job is done on a No. 12 Hydraulic Automatic Lathe with both ends of the frame machined at once.

Simultaneous machining of the two rabbet fits assures a minimum and uniform air gap. It also means the end bells are concentric, parallel and in perfect alignment.

One Automatic Operation

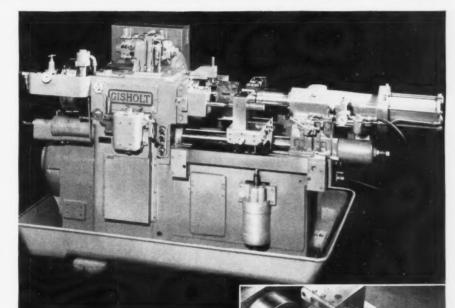
The frames come to the No. 12 Hydraulic with motor windings in place. The parts are quickly located and held by an air-operated mandrel. Tools on all four slides complete the rabbet fit and facing of both ends in one automatic operation. Floor-to-floor time on all motor frames is low, with the 204 frame (83/8" stator) handled in only .7 minute with carbide tooling.

The job is planned for rapid changeover with tool slides having individual tool adjustments for handling the full range of frame sizes.

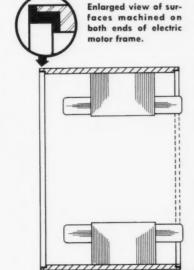
Fast, steady output of a variety of motor frames is provided by the No. 12 Hydraulic—with further savings coming from its extreme simplicity of setup, operation and maintenance.



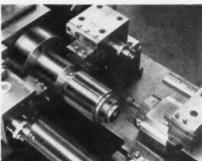
You'llgeta good look at the No. 12 Hydraulic Automatic Lathe—its versatility and speed—when you have this complete new catalog. In it are full information and specifications plus photos and facts on 28 different jobs! Write for it today.



The No. 12 Hydraulic for machining electric motor frames.



No. 12 Hydraulic with part chucked.



Tool setup of No. 12 Hydraulic with air-operated mandrel.



TIME-SAVING IDEAS

CONTOUR BORING WITH C/F TURRET LATHE

Work Done with Special Cam Plate in Standard Taper Attachment

This 3L Saddle Type Turret Lathe is busy at top priority work in our nation's big jet engine program. The part is a turbine nozzle support, still high on the restricted list.

However, it's no secret how the cross-feeding turret and taper attachment of this turret lathe solved the problem of boring a special I.D. contour. Instead of a conventional guide plate, a special cam plate is inserted in the standard taper attachment. A cam follower on the cross feeding hexagon turret follows this guide while the stub boring bar completes the contour boring. After completing the cut, the follower can be instantly disengaged from the hexagon turret for straight turning and boring work.

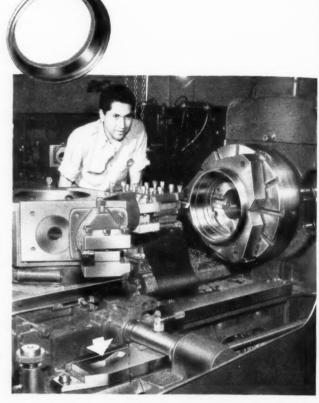
There's a four-page picture story that shows how unusual turret lathe tooling and setups are producing vital turbojet engine parts. Ask for "Turret Lathes Build Turbojets."



Turbine nozzle support is machined from raw forging.

Setup for machining I.D. contour of jet engine turbine nozzle support. Note special cam plate in taper attachment.

Single special cam plate adapts standard turret lathe for contour boring work.



HE'S DOING IT THE RIGHT WAY

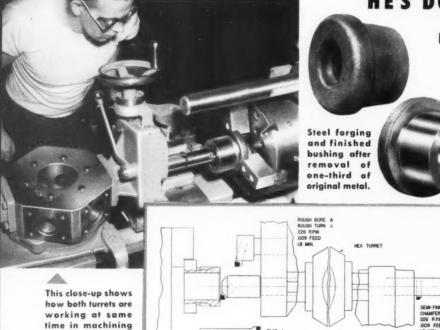
Both Turrets Working at Same Time

There's a reminder in this photo for all of us... and that is to watch every turret lathe job for the opportunity to do simultaneous machining from both turrets.

The part here is a bushing. It's machined on a No. 5 Ram Type Turret Lathe from a steel forging by well-planned but simple tooling. Rough turning, rough and finish boring and chamfering are all handled from just two faces of the hexagon turret. While this is taking place, tools on the quick-indexing square turret do finish turning, rough and finish facing and forming.

Thus, through the simultaneous use of both turrets, six surfaces are machined on this 51/8" steel forging in only 5.4 minutes floor to floor. If only one turret were working at a time, the job would take far longer.

Simple multiple tooling on the hexagon turret, plus simultaneous machining from both turrets, means real efficiency on this job.



(2) 226 R.PM.



bushing.

Tool setup for ma-

chining bushing.

EARMARK YOUR DEPRECIATION ALLOWANCES FOR NEW MACHINE TOOLS

the

MI

don't of th Auto it's a Co., j in lo cylin set uj Statio and cross Roug

while

faces

the h

4-F

for p ment W hand mati long min

Sim

The impowell high givin Auto

EAR

HOW TO MAKE BIG SAVING ON MEDIUM RUNS



Typical flywheels

machined on the one

Fastermatic set up for machining cast-

Fastermatic.

iron flywheels.

SAVING IDEAS

FAIRBANKS-MORSE Knows the Way-with the Fastermatic Automatic **Turret Lathe**

H E

1Y

ne

for

erv

to

oth

[t's

nrellgh nd ust ile ckrnnd us re ng If

er.

Here's another case that proves you don't need big runs to take advantage of the economies of the Fastermatic Automatic Turret Lathe. This time it's at work for Fairbanks, Morse & Co., producing a variety of flywheels in lots of 100 for their famous onecylinder gasoline engines. The job is set up this way:

Station 1-Core drill, rough the O.D. and rough face the hub while rear cross slide straddle faces the rim. 2-Rough the bore and finish the O.D. while front cross slide finish straddle faces the rim and 1/16" radius. 3—Face the hub with turret facing attachment. 4-Finish the bore. 5-Face spokes for pulley fit with turret facing attachment. 6-Ream the bore.

With this medium run job now handled on the Fastermatic Automatic Turret Lathe, there are no longer the delays in assembly which minor errors of hand operation

caused. Man power is more productive because one operator can run two or more machines.

The faster production and greater accuracy of the Fastermatic, with one man operating two machines, make possible big savings on medium runs.

NINE DEEP GROOVE CUTS IN ONE OPERATION

Simplimatic Automatic Lathe Simplifies the Job

The part you see here is an allimportant compressor rotor for a well-known jet engine. Accuracy and high production are good reasons for giving the job to the Simplimatic Automatic Lathe.

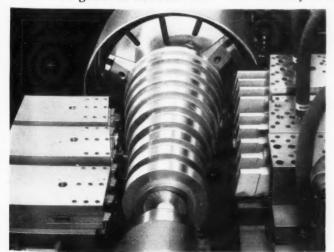
The nine grooves between the

stages must be widened carefully. To do this, twenty-seven grooving tools are mounted in three rear slides. These have a common drive and are arranged so that only one slide is cleaning up at a time. This avoids excessive tool pressure.

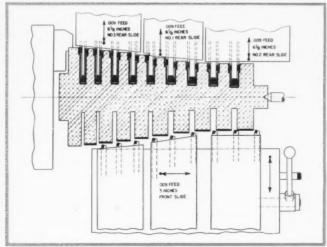
Tools on the single front slide turn nine diameters with automatic approach, feed and return. Tools are fed laterally to machine all stage

diameters except the large holding diameter. The front slide is then manually retracted to provide unloading clearance. Floor-to-floor time is an even nine minutes.

With 36 tools on front and rear slides, this Simplimatic accurately machines these difficult parts in one chucking.



Tooling on front and rear slides for machining compressor rotor.



Tool arrangement of Simplimatic for compressor rotor job.





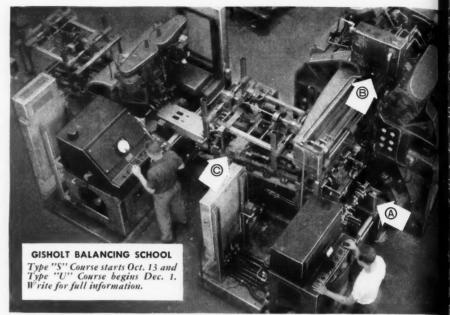
NEWEST IN CRANKSHAFT BALANCING

Amazing Machine is Ultimate in Automatic Operation

TIME-SAVING IDEAS

Wonders never seem to cease in this important field of balancing—as proved by this special DYNETRIC Balancing Machine now on the job for a large automobile manufacturer. The machine handles V-8 crankshafts. Here's the way it operates:

- 1 Crankshaft is inserted in machine, and operator measures and locates unbalance. This data is electrically transmitted to 1st correction driller.
- 2 Crankshaft is conveyed into driller where correction is automatically made on basis of data received from Balancing Machine. Meanwhile, unbalance in next crankshaft is being measured and located.
- **3** With 1st drilling completed, crankshaft is automatically carried to 2nd balancing stage. This "unloader" serves as a storehouse, holding up to 7 crankshafts as a reserve in case of line stoppage.
- **4** Second operator measures and locates any unbalance remaining after 1st correction and makes final corrections with small driller.
- **5** Crankshaft moves to 2nd "unloader" and on to assembly line for Superfinishing.



Crankshaft enters machine at (A), is balanced and moves into driller (B) for correction. It then travels "unloader" (C) to 2nd machine for final balancing.

Production is 40 balanced and inspected crankshafts per hour.

While this is a special machine for automotive work, Gisholt balancing equipment is adaptable for virtually all balancing problems—high production or not. Write for 6-page

reprint, "Continuous Crankshaft Balancing," giving the full story on this crankshaft job.

(

A

C

C

0

A

5+

EE



CAMSHAFT BEARING SURFACES GIVEN LONGER LIFE BY SUPERFINISHING Five Surfaces Superfinished at Once at Little Cost operated tailstock. While the

Here, a Model 80 Superfinisher is in the process of making life easier and longer for camshafts—through finer, smoother, longer wearing bearing surfaces.

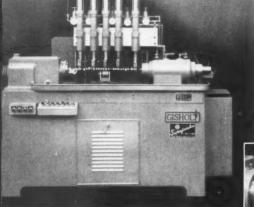
The camshaft is loaded into the

collet and supported with an airoperated tailstock. While the camshaft is rotating, the Superfinishing stones oscillate to scrub away the amorphous metal left by grinding. In 0.5 minute floor-to-floor time, this operation is complete.

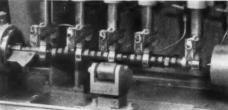
These camshaft main bearings have a surface finish of 30-40 microinches before Superfinishing and 4-6 micro-inches after. The machine is quickly adjusted for other sizes.

The entire subject of Superfinishing is interestingly told in the book, "Wear and Surface Finish." Send for your free copy.

Better camshaft performance is assured with smear metal, grinder flats removed from bearing surfaces by Superfinishing.



Model 80 Camshaft Superfinisher.



Close-up showing Superfinishing of 5 surfaces at once.

No. 7-852



THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES . AUTOMATIC LATHES . SUPERFINISHERS . BALANCERS . SPECIAL MACHINES

Bal-this

I L E L A D O T R O L A J L SEE

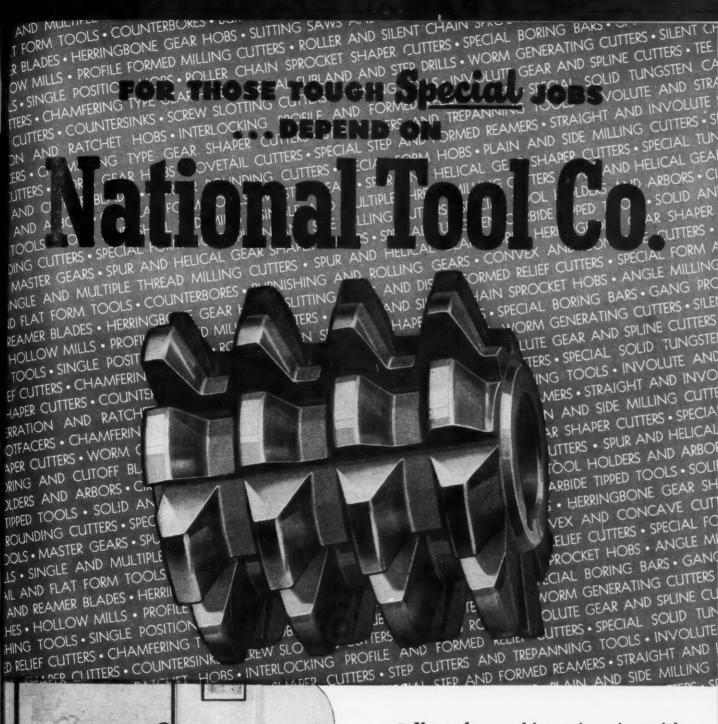
air-cam-ning the ing. this ngs cro-4-6 e is ing ok, for

ved ing.

ES

A FO BLU S FERSI LIAN NO CON MINING FLAND OF FARTH OF A PER O DISSENSITION OF A MINING FLAND OF A PER OF A MINING FLAND OF A MINING FLAND

HES . HING D RELI





tooling and related production problems are yours for the asking. When the job requires special cutting tools call in your National Tool Co. representative. He is backed by more than 46 years experience in the engineering and manufacture of special cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry

National Tool Co.
Cleveland 2, Ohio



product

CAMPBEL **ABRASIVE** CUTTERS

Fast, Low Cost Cuts

• Cutting any type of material by the CAMPBELL Abrasive method produces high quality parts with excellent finish and dimensional accuracy, often saving subsequent operations. CAMPBELL machines control heat in both work and cutting wheel. Wheel is entirely enclosed in safety guard. Many models are available. Ask for "Principles of Abrasive Cutting."

Tell us your cutting problem and we'll make recommendations.

Model 406 Abrasive Cutter

Model 223 Abrasive Cutter

Model 15 Abrasive Cutter

and CAMPBELL NIBBLERS

Model 2524

• The modern way to cut sheet metal to any desired shape. High speed, variable stroke. Quick and inexpensive. Literature will be sent on request.

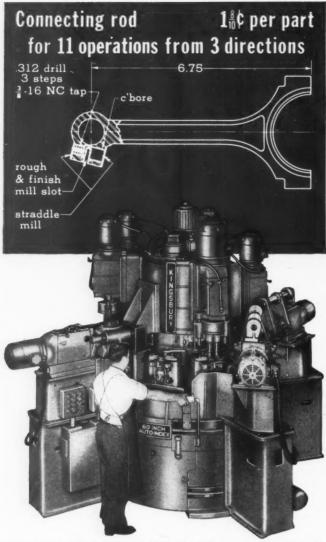


CAMPBELL MACHINE DIVISION AMERICAN CHAIN & CABLE

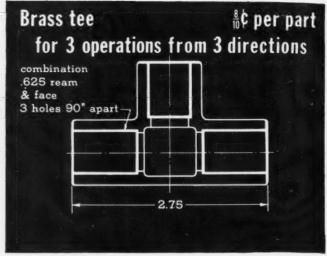
925 Connecticut Ave., Bridgeport 2, Conn.

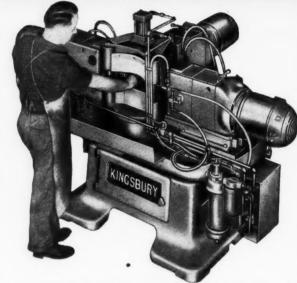
CAMPBELL

Abrasive Cutters and **Nibblers**



500 PARTS AN HOUR GROSS. Each fixture on this 60-inch "Auto-Index" holds two parts. Horizontal units mill both parts with one cutter. Vertical units on the central column do the holes with two-spindle heads; the counterboring head is inverted.





500 PARTS AN HOUR GROSS. The operator just removes a finished part, replaces it and presses a lever. The machine automatically clamps the work, operates the opposed tools and then the third tool and unclamps the work. There is no indexing.

How much do you pay for

A study of four special drilling and tapping machines that produce at the same rate: 500 parts an hour gross

Dear Sir:

At 80% efficiency each of these Kingsburys averages one finished part every nine seconds. What would that much production cost you?

Each drawing shows the cost for the man and his Kingsbury — no power or overhead. The cost for each man is the same — one 400th part of today's national hourly wage rate. (The 400 is from 3600 secs. in an hour ÷ 9.)

The difference in costs is in the machines, of course. Notice how small this difference is—just one cent be-

tween the highest and the lowest, the Connecting Rod and the Brass Tee.

What What a difference

Yet the total price of the Rod machine is seven times that of the Tee machine. The Rod machine is a massive affair — an 84-inch base with four knees and a central column, nine operating units and a 60-inch power index unit with ten work fixtures that alone weigh 1.2 tons. The Tee machine has just a 68-inch base, three drilling units and one work fixture.

But in unit costs the difference is

just one cent, on the basis of amortizing the entire investments in machine and tooling over 6000 hours, a fraction of the useful lives. 500

has

the

hole

nar

cus

thr

was

non

ma

tab

WOI

Con

usu

plu

aux

belo

Naturally your figuring might be different. But on a high production basis your costs should be close to ours. With low production — well, that's something else again.

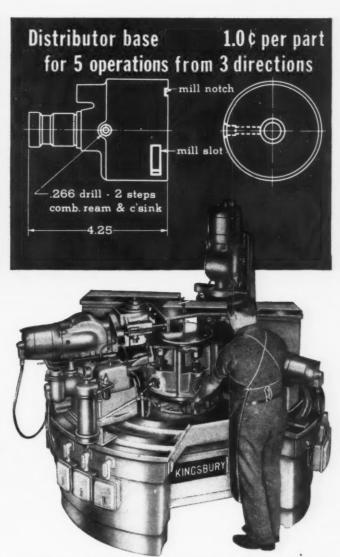
Meets your specifications

All four of these Kingsburys have the same hourly production rate — 500 parts gross or 400 parts at 80% efficiency. We picked them this way on purpose for this comparison.

Actually we design, build and tool each machine to meet each customer's specifications — the operations he

Crankshaft for 7 operations from 3 directions 5.75 .120 drill · 2 holes .120 end mill (to start drill) .120 drill · 2 steps KINCSBURY

500 PARTS AN HOUR GROSS. A 20-inch power index table has seven fixtures. Three horizontal units end mill and drill the long .120 hole. The inverted angular unit drills two .120 holes. Two hidden angular units drill and ream the .188 hole.



500 PARTS AN HOUR GROSS. All units on this 20-inch index machine are off the radial lines through the fixtures. Three horizontal units for the hole are 20° left. Another for the slot is 30° right. The vertical unit that mills the notch is 10° right.

9 seconds of production?

names, the production rate he names.

Among other things, each of these customers wanted operations from three directions in one chucking. It was easy for the Brass Tee since each hole needed just one operation. A non-index machine with three automatic drilling units did the trick.

It takes ingenuity

The other three machines had index tables, so it took more ingenuity to work from three directions. The Connecting Rod machine has the usual horizontal and vertical units plus a vertical unit with an inverted auxiliary head that counterbores from below. The units for the Crankshaft are horizontal and at two different

angles. For the Distributor Base one unit is vertical and the others are horizontal but at angles to the radial center lines through the work fixtures.

That is, of course, just part of the problem. It takes ingenuity to design a fixture that will hold the work firmly, locate it properly, and still leave room for the tools to operate and the chips to escape. It takes ingenuity to mount all fixtures in

exact location on the index table so that all finished parts are fully accurate and uniform. It takes ingenuity on this type of equipment to locate tools to close tolerances.

We feel sure we have the ingenuity to design, build and tool a machine that will meet your requirements.

Sincerely,

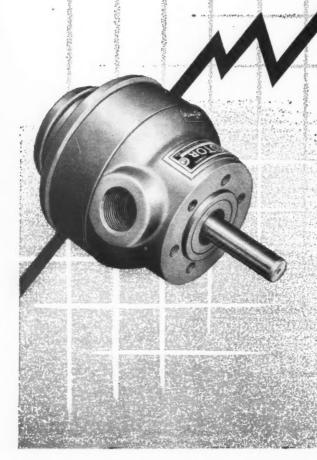
Kingsbury Machine Tool Corp. 97 Laurel Street, Keene, N. H.

KINGSBURY

AUTOMATIC DRILLING
& TAPPING MACHINES
for Low-Cost High Production

SALES CURVES... PRODUCTION CURVES...

Construction of the second of



GEROIOR HYDRAULIC PUNCTURES

TO

for

usec

Оре

LE/ YO BE

Send

BR

Built into your product, GEROTOR pumps deliver performance that steps up sales. On your production line, GEROTOR pumps increase machine tool efficiency. In any application, the GEROTOR principle means less wear, less slippage, more uniform flow. Pressures to 1200 p.s.i. continuous duty, 1500 intermittent.

GEROTOR MAY CORP., Baltimore 3, Md.

FORM-DRESS GRINDING WHEELS

Accurately.....Rapidly

TO TENTHS OF A THOUSANDTH

IN A MATTER OF MINUTES

with

PRATT & WHITNEY

Diatorm

WHEEL FORMING
ATTACHMENT



FORM GRINDING TO NEW
STANDARDS OF ACCURACY... is easy with DIAFORM

precision-dressing. You will be able to produce better dies, punches, and flat forming tools in hours instead of days.

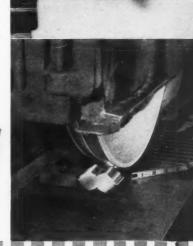
The Pratt & Whitney DIAFORM attachment is a lightweight, portable instrument that provides a very fast, easy and accurate means of forming and re-trueing grinding wheels. It can be used with horizontal spindle surface grinders, and does not interfere with normal operation when left in place on the machine.

Operation is on the pantograph principle. A tracer is lightly traversed over an inexpensive template DIAFORMING even the most complex forms in a matter of minutes. Two sizes of DIAFORM are available: 1" capacity for DIAFORMING wheels up to 10" diameter using 10 to 1 reduction ratio, and 3" capacity for wheels up to 20" diameter using 5 to 1 reduction ratio. Like all Pratt & Whitney products, the DIAFORM is manufactured and inspected to conform to rigidly high standards of quality and accuracy.

LEARN HOW DIAFORM CAN MAKE YOUR FORM GRINDING OPERATIONS BETTER AND MORE PROFITABLE

Send today for these two Bulletins. Just fill in and mail the attached coupon or write on your Company letterhead.





PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

WEST HARTFORD 1, CONN., U.S.A.

BRANCHES IN PRINCIPAL CITIES



PRATT & WHITNEY - Div. Niles-Bement-Pond Co.

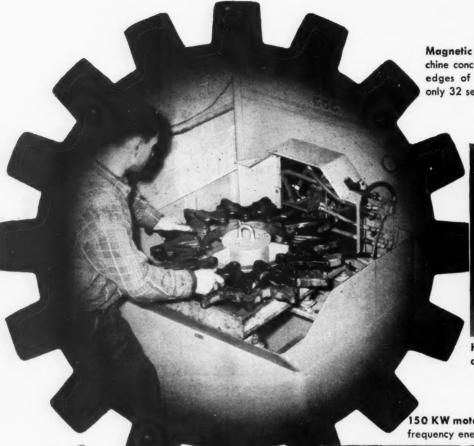
12 Charter Oak Blvd., West Hartford 1, Conn.
Gentlemen: PLEASE MAIL MY COPY OF:

□ BULLETIN NO. 543, DIAFORM FOR WHEELS UP TO 1" WIDTH.
□ BULLETIN NO. 548, DIAFORM FOR WHEELS UP TO 3" WIDTH.

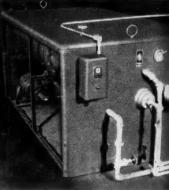
NAME POSITION COMPANY CO. ADDRESS ZONE STATE

First Choice for Accuracy

CUTTING TOOLS . GAGES . MACHINE TOOLS



Magnetic field of induction hardening machine concentrates terrific heat on working edges of sprocket tooth, hardening it in only 32 seconds.



Heat exchanger and soft water circulating pump used for quenching.

150 KW motor-generator supplies high frequency energy (10,000 cycles) to inductor.

Induction) Hardening

Induction hardening is a quick metal heat-treating process which forms an homogeneous, nodular structure free from the usual needle-like crystals resulting from furnace hardening. Induction hardening controls absolutely the depth of penetration and pattern of the hardened surface, retains original ductility of the core, and holds distortion to an infinitesimal degree.

- Unusual equipment—yes. But it enables BRAD FOOTE to produce gears, in its own shop, with the ultimate in wearability.
- Induction hardening is another BRAD FOOTE service in our complete control of quality gear manufacturing. It is further proof that "no one shares our responsibility."

BRAD FOOTE GEAR WORKS, INC.

1309 South Cicero Avenue • Cicero 50, Illinois Blshop 2-1070 • Olympic 2-7700

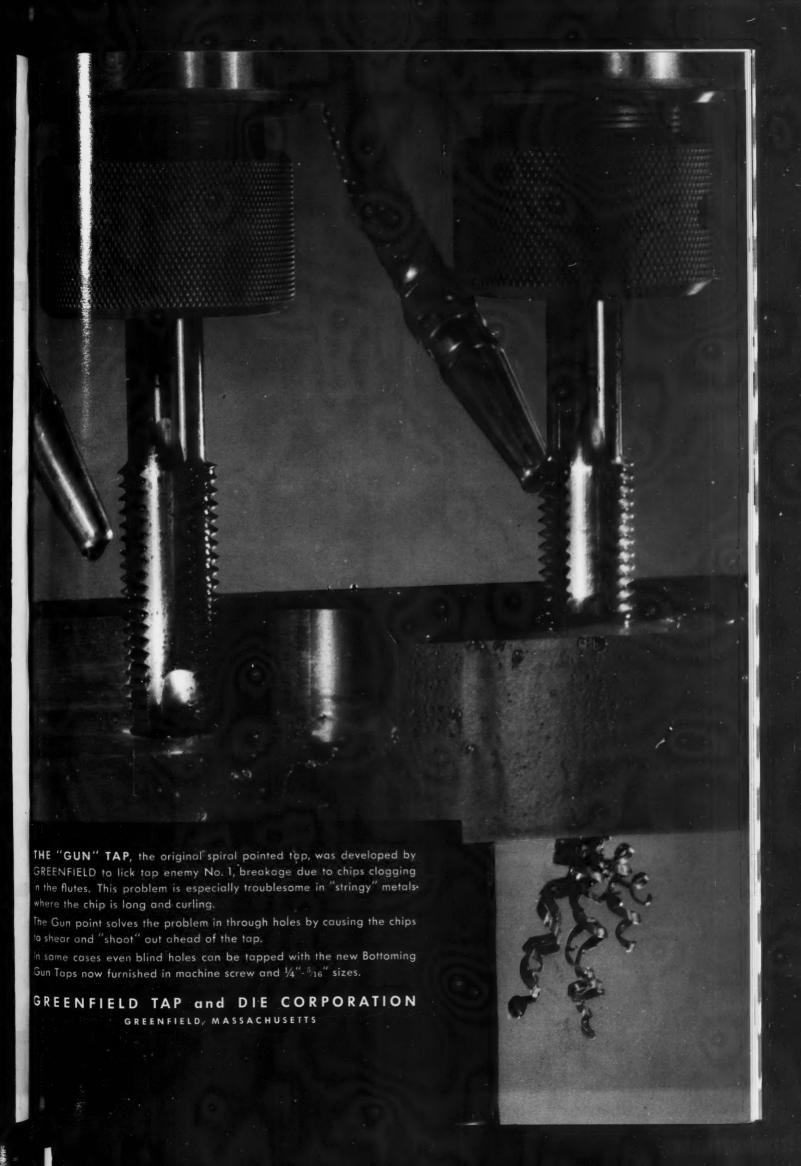
subsidiaries

AMERICAN GEAR & MFG. CO. • PITTSBURGH GEAR COMPANY
Phone: Lemont 920 Phone: ATlantic 1-9950
Lemont, Illinois Pittsburgh 22, Pennsylvania



THE GREE in the where The Green to she

GR



onvertible self-opening die head

with aligning shank

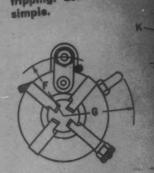


Bulletin DS B pages

Style DS

There is no better die head for use on Brown and Sharper automatics, and for other small screw machines of either the automatic or hand type, than the improved convertible self-opening Geometric Style DS die head.

In the four smaller sizes, the Dishank which permits adjustment. All sizes are equipped a short length, fine pitch shoulder for threading lengths providing tripping. Conversion from one simple.



OUTSIDE T

					70000	363	103			4			B		G	H	1	K	Sn	ankst	
Style and Size Inches	T		CAPACITY Str. Threads		ds	Std.	10000	de ord	A										Dia.	Lgt. Bo	Bore I
	re l	MACHINE USED ON	Dia.	Lgt.	Coars- est Pitch	Pipe							+		C-00	10000	Max.	10-32 N.F.	3/4	6 5	11/32 Solid
		00 and 00G-B. & S. Auto. 0-B. & S. Wire Feed & Hand	1/16	11/4	-18	Non			15% 1	13/6	36 17	1/2 3	1/6	11/16	13/6	15/32 Min. 9/32	Min.		7/8	6 5	olid
D		Cleveland S.S.	5/16		75		D	esce						194	1156	Max.	Max.	12-28 N.F.	1	21/2	1/2 5/8 Solid
+	DS %6	0 & 0G-B. & S. Auto. 1-B. & S. Wire Feed & Hand	1/a to	15/6	12	1	C	Desaf Desag Desal	23/16	23/16		3/8	9/66	13/6		Min. 11/32	Min. O		11/4	7	Solid 11/16
3		Cleveland S.S.	3/16	1	+	+	-	Desam				"	5/6	113/6	21/16	Max.	3/16	1/4-28 N.F.			Solid
1		2 & 2G-8, & S. Auto. 2-8, & S. Wire Feed & Hand		21/4	10	6	to	Desap Desar	27/6	27/6	11/6	13/16	76	1	1	Min 3/8	0	1.0	+	23/8	11/1
1	DS 3/4	Cleveland S.S.	3/4	+	+	+	1/6	Desat	33/16	31/6	11/4	11/16	11/1	2	25%	6 Mai	3/16 n. Min	N.F		4 31/4	134
	DS 1	2-8. & S. Wire 1000	to 1		4 1	0	1/2	Desav	3716	0,0			-	+	+	3/8 M	ax. Ma	x. 12-	28 1	23/1	No
SHANKS		4-B. & S. Auto. 4-B. & S. Wire Feed & Hand		-	3/4	14	None	Deswo	27/8	2%6	11/2	15/16	5	6 13/	4 21	8 N	in. Mi	n. N.	+	+	4 1
	DS 1	2 & 2G-8. & S. Auto. 2-8. & S. Wire Feed & Han	d 13/4	1	/4		-	Desy	311/	25/	21/	113/	6	5/8 2	1/4 2	3/6 A	3/4	1/4- in. N	28 F.	31/	1

NOTE: Standard D Chasers used in %6" and ¾6" sizes.

***Pie Head modified with dearance to swing on machine.

***Minimum Shank Diameter without shoulder is 5%" on %6" DS, 7%" on %6" DS and 11%" on ¾6" DS.

GEOMETRIC TOOL COMPANY DIVISION Greenfield Tap and Die Corporation NEW HAVEN 15, CONNECTICUT

Max. Shanks without Shanks with S

Once, for tec Easy of accele auton the re

M

In the auto in sistent Alway operat Recent revolution panies one manual of the control of the co

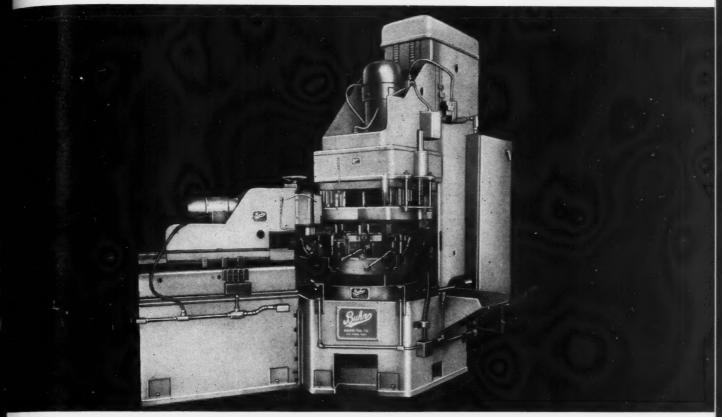
To mil nection To ma phase in Buh

Wha

In ge combin spotfaction be bination



NO JINX NOW FOR JUDY OR JANET



Once, it took a man to drive a car.... Now it's second nature for teen-ager Judys and grandma Janets to drive them.... Easy or effortless to shift gears... easy to steer... to brake and accelerate... even easier to own the cars—thanks to modern automotive engineering and production!... Here's one of the reasons—Production Equipment to make the parts for

modern cars.... Equipment like this Buhr Two-Way Hydraulic-Feed Milling, Drilling and Tapping Machine—one Machine which an Automotive Giant depends on morning-noon-andnight to process Water Outlet Connections for modern engines—to manufacture parts so well and so economically ... that driving a car is no longer a jinx for Judy or Janet!

Modern Auto-Making Economy Achieved by This Type of 2-Way 6-Station Unit

In the constant competitive combat of the auto industry, every company strives persistently for greater production efficiency. Always, they try to group manufacturing operations to keep costs to the minimum. Recently, to produce a new part for a revolutionary engine, one of the auto companies decided to group operations in one machine.

One of Their Problems



To mill, drill and tap a Water Outlet Connection—that was their immediate problem.

To make the Equipment to handle this phase of their production, they called in Buhr.

What the Machine Does

In general—it mills mounting Flange; combination drills and reams 2 holes and spotfaces small Flange surface; combination bores 2 holes and drills 2 holes; combination counterbores and countersinks 2 holes, and combination drills and reams 2 holes, and taps 2 holes.

Specifically, the Machine does this-

Station 1-Load and Reload

Station 2—Mills mounting Flange surface Station 3—(1st Position) Combination drills and reams (2) .406 dia. holes; (2nd Position) Spotfaces small Flange surface to 2.320 dia.

Station 4—(1st Position) Combination bores (2) .350 dia, and (1) .440 dia, bore; (2nd Position) Drills (2) .257 dia, holes. Station 5—(1st Position) Combination counterbores (2) .570 dia, and (2) .06 dia, holes; (2nd Position) Countersinks (2) 90° x .280 holes.

Station 6—(1st Position) Combination drills and reams (2) .328 dia. holes; (2nd Position) Taps (2) 5/6-18 Class 2 holes. PRODUCTION—144 Parts at 100% Efficiency.

Why Buhr Was Chosen

For more than a quarter-century, Leading Auto Makers have depended on Buhr for efficient production. . . . Especially in the field of Multiple-Spindle Drill Heads, the name of Buhr has long meant the finest. . . . Buhr's manufacturing facilities are ex-

cellent.... In sales, engineering and production, Buhr has trustworthy and experienced staffs—the kind of staffs these leading Auto Giants turn to when production problems call for this type of Special Machinery.

For Details About BUHR



A comprehensive Catalog . . . or a personal call from a Buhr Sales Engineer . . . is yours for the asking wherever you are located in the United States! . . . For every problem involving this type of Special Machinery—including the type which helps beat the jinx for Judy and Janet—phone, wire or write us.

BUHR MACHINE TOOL CO.

Ann Arbor, Michigan

Phone: Ann Arbor 2-5646—5980 Detroit WOodward 3-2126



SPECIAL MACHINERY... Leaders Make Sure With BUHR



When minutes saved mean dollars earned, look to TOCCO Induction Heating

Singer Manufacturing Co., makers of famous Singer Sewing Machines, reports the following results when they switched to TOCCO—hardening the shaft assemblies shown above. Note the operations eliminated through the use of TOCCO and the savings of 151.8 minutes per 100 parts.

OLD METHOD		TOCCO METHOD				
Operation Min	./100 Pcs.	Operation	Min./100 Pcs			
Assemble on plating racks	23.0	eliminated				
Copper plate crank end	43.0	eliminated				
Remove from plating racks .	15.0	eliminated				
Harden shaft and		TOCCO harden				
anneal crank	120.0	and clean	92.5			
Strip lead	10.0	eliminated				
Strip copper and clean		eliminated				
Old method		TOCCO method				
total time	244.3 minutes	total time	92.5 minutes			

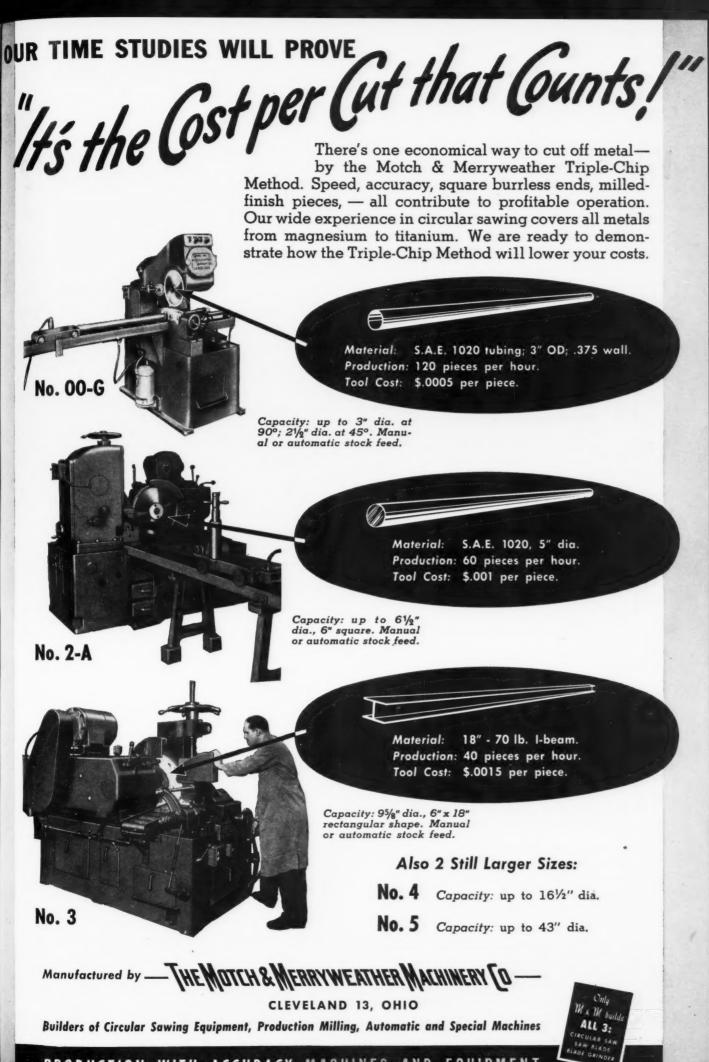
Have you investigated TOCCO's time and cost savings possibilities for your hardening, brazing, forging or melting operations? It will pay you to write or send blueprints of your parts for analysis—no obligation of course.







Induction Heating Equipment must meet the requirements of the Federal Communication Commission's Rules and Regulations Relating to Industrial, Scientific and Medical Services, Part 18. All TOCCO equipment is certified to comply with these rules and regulations.



PRODUCTION - WITH - ACCURACY MACHINES AND EQUIPMENT

When Does a Band Saw Become a Machine Tool?

There are basic requirements of accuracy and proficiency that separate a "machine tool" from other power tools... characteristics such as those which distinguish a toolmaker's screw-cutting, precision lathe from the woodworking lathes used in grade school manual training classes. Among metal-cutting band saws, only the MARVEL No. 8 Series Band Saws can qualify as machine tools, for only MARVEL Band Saws have the following capabilities and features:

- 1 Angular cutting from 0° to 45° right or left without moving the work. Built-in protractor.
- 2 Vertical blade power-fed into material—permits reentrant cuts, notching, mitering, keyway sawing, etc.
- 3 Automatic power or manual feeds at the flick of a finger.
- 4 Feed pressure adjustable even when machine is running. Indicated in actual pounds of pressure.
- 5 Work clamped to table of machine. Working area more than 835 square inches.
- 6 Tee-slotted table facilitating clamping down of odd and irregular shaped pieces; easily supports heavy work or large and long structural shapes. Standard vise chucks work on either side of blade.
- 7 Automatic blade tensioning device. Every blade at uniform tension regardless of operating efficiency.
- 8 Adjustable upper guide roller holder insuring minimum section of unsupported blade on all sizes of material. Quick acting.
- 9 Built-in coolant system with delivery at blade entry point. Pump driven without belt or gears.
- 10 Replaceable vise ratchet and table wear strips of tool steel. New saw performance at all times.
- 11 LARGE CAPACITY. Standard: 19½" x 18¾". High column: 25½" x 18¾". Handles 99% of all work.

Before buying any metal-cutting band saw, be sure to see the versatile MARVEL No. 8. Your local MARVEL Field Engineer will demonstrate its significant "machine tool" characteristics and their application to your work, with costs, savings, cutting speeds and methods. This technical service is provided, without obligation, in the interests of better metal sawing.

If you prefer to "study it out for yourself," write for the MARVEL C-49 Catalog.

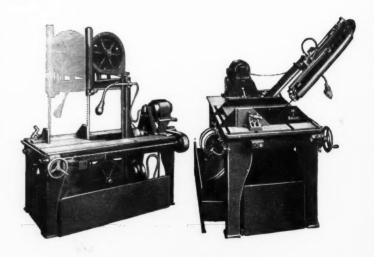


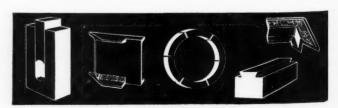
ARMSTRONG-BLUM MFG. COMPANY

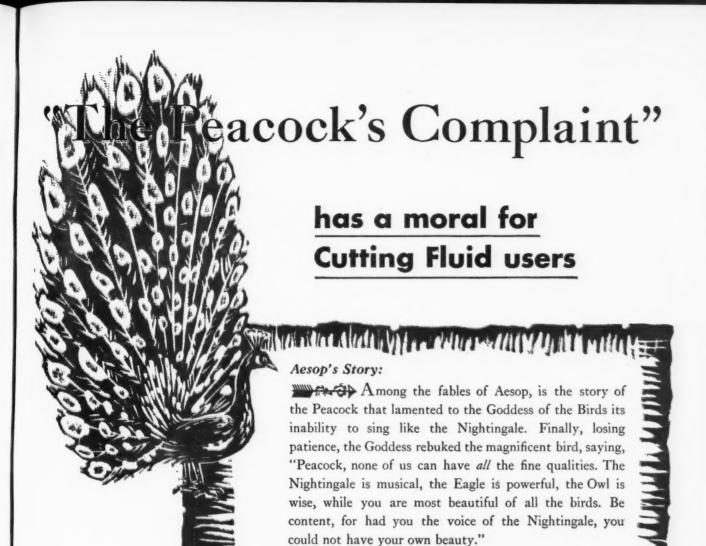
5700 Bloomingdale Ave.

Chicago, U.S.A.









The Moral:

Just as the Peacock in Aesop's fable excelled in beauty of plumage but not of voice, so does no single cutting fluid excel in every desired characteristic.

For example, in machining tough, stringy materials, a cutting fluid must have high antiweld characteristics to prevent scuffing and resultant poor surface finish. However, on free machining materials the anti-weld requirement

must be balanced for maximum tool life consistent with desired finish.

The fable simply points up the fact that there is no universal cutting fluid to give best results on every job.

The Stuart Oil Co. and its representatives offer you no compromise products. They are prepared to help you correctly select and apply the cutting fluids that will give you the best possible results on your particular work.

More Than a "Coolant" is Needed

TIME-TESTED CUTTING FLUIDS AND LUBRICANTS 2739 S. Troy St., Chicago 23, III.



SEND FOR BOOKLET entitled More Than a "Coolant" is Needed CLIP TO YOUR COMPANY LETTERHEAD AND MAIL

to D. A. Stuart Oil Co., Ltd., 2739 S. Troy St., Chicago 23, III.



Survey by Leading Motor Manufacturer Proves

NORMA-HOFFMANN Prolubricated "CARTRIDGE" BEARINGS



A recent survey of over 131,626 A-C motors shows the use of ''Cartridge'' Prelubricated bearings saved a yearly average cost of \$270.00 per hundred motors by eliminating periodic relubrication.

In addition to this \$270.00 saving, motors using "Cartridge" bearings showed an indicated saving of \$480.00 by reducing motor outage, lost machine time and man-hours.

A total yearly saving of \$750.00 per hundred motors! You, as a manufacturer of motors, machine tools, pumps or other machinery can pass these savings to your customers by using Norma-Hoffmann 'Cartridge' Ball Bearings. How — because these patented bearings require no periodic relubrication.

Made to double-row width, Norma-Hoffmann "Cartridge" single-row ball bearings have 100% more grease capacity than conventional width sealed bearings. The highly efficient seals keep dirt out, grease in. Factory-packed with Norma-Hoffmann's specially compounded "stability-tested" grease grease that is highly resistant to oxidation and breakdown . . . assures dependable operation for long periods without regreasing.

Use Norma-Hoffmann "Cartridge" Ball Bearings in your products. Our engineers are always available for consultation on your bearing applications. Write for their services.

NORMA-HOFFMANN Precision BEARINGS

NORMA-HOFFMANN BEARINGS CORPORATION STAMFORD, CONN.
FIELD OFFICES: Atlanta, Birmingham, Charlotte, Chicago,
Cincinnati, Cleveland, Dallas, Detroit, Jacksonville, Kansas City,
Los Angeles, San Francisco, Seattle



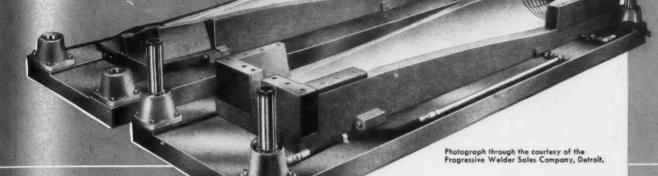


HOT FORMING

aircraft propeller blades This unique new process takes a previously hot-worked billet and hot forms it into a one-piece hollow steel aircraft propeller. Now, in three steps requiring only a few minutes, a superior propeller is produced that formerly required hours of work.

The development gave rise to the problem of building a special 15 ton die that would provide a quenching action from 1450 degrees in a five minute press cycle.

For a die like this, the diemakers called for ...



DANLY DIE SETS

*CALL ON YOUR
NEAREST DANLY BRANCH
for fast, local delivery!

*CHICAGO 50, 2100 South Laramie Avenue
*CLEVELAND 14, 1550 East 33rd Street

*DAYTON 7, 3196 Delphos Avenue

*DETROIT 16, 1549 Temple Avenue

*GRAND RAPIDS, 113 Michigan Street N.W.

INDIANAPOLIS 4, 5 West 10th Street

*LONG ISLAND CITY 1, 47-28 37th Street

*LOS ANGELES 54, Ducommun Metals & Supply Co., 4890 South Alameda

MILWAUKEE 2, 111 East Wisconsin Avenue

PHILADELPHIA 44, 18 West Chelten Avenue

*ROCHESTER 4, 16 Commercial St.

*Indicates complete stock



Reliable Danly precision plus unmatched facilities for the production of standard of special die sets like the one shown here make Danly Die Sets the first choice of diemakers everywhere. A nation-wide system of branch assembly plants* assures prompt, time saving service.

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois



MORE THAN 25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY



Model L 5 1/2-12 Steelweld Press bending 5/16" steel plate, 20'-0" long

How long does it take you to weld or rivet two $\frac{5}{16}$ " x 20'-0" steel plates together at right angles? How long if you were making a U-shaped or Z-shaped item?

For work of this sort you will find a Steelweld Press a most useful tool. It will cut time and cost to a small fraction. You will save even when you only have occasional odd jobs. For production runs the reduction in time is tremendous. And you will save rivets and angles or welding rod and power too.

Bending is just one of the various types of work you can do on a Steelweld Press.



CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

5445 EAST 281st ST.

WICKLIFFE, OHIO



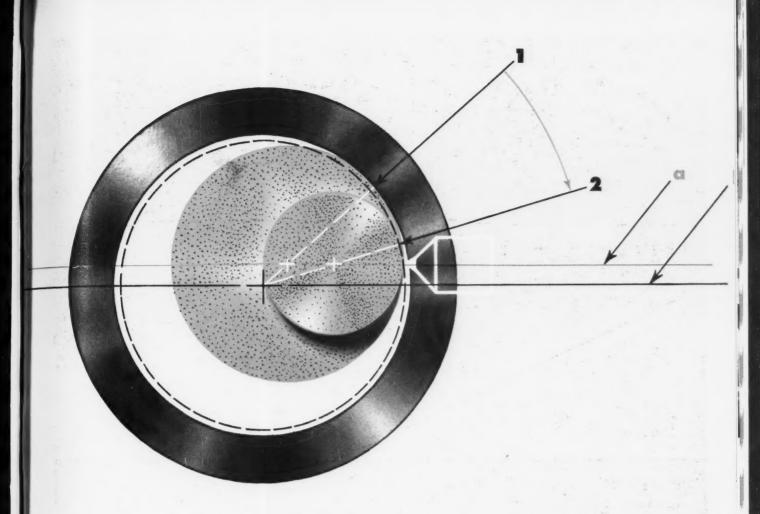
STEELWELD

BENDING PRESSES

BRAKING - FORMING - BLANKING - DRAWING - CORRUGATING - PUNCHING



in



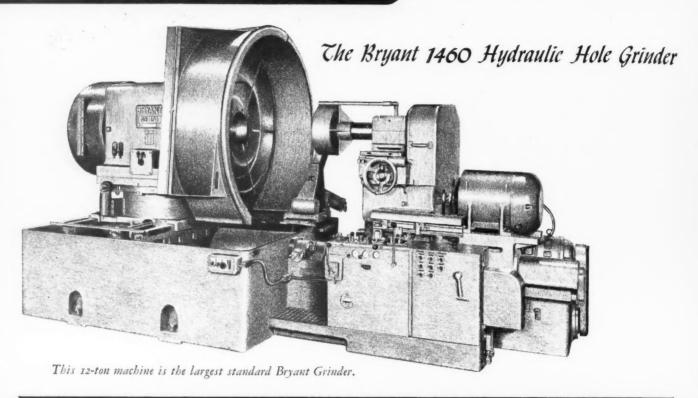
bryant internal grinding If the internal grinder is to generate straight holes within precision tolerances, on a production basis, the various elements of the machine must be properly aligned. The axis of the work, the axis of the wheel, and the diamond must be in a plane parallel with both traverse and cross feed ways. Then the direction of feed will coincide with the line from the center of the workpiece to the point of contact between the wheel and the work, and the wheel will be dressed in line with its point of contact with the work regardless of the size of the wheel.

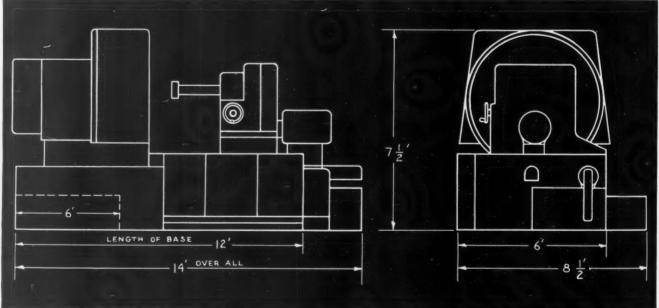
In the illustration above, these requirements are not met because the work center "b" is below plane "a" established by the wheel axis and the diamond. The drawing shows the wheel at its largest diameter (new) and also at its smallest diameter (worn). The difference between center heights "a" and "b" is constant during the life of the wheel. The position of the diamond remains constant for the life of the wheel. When the large wheel is dressed by the diamond it will contact the work at a point established by a line from the center of the work through the center of the wheel (position 1). When diamond sizing, the work, or wheel, is fed to a predetermined position. As the wheel wears down, it will continue to contact the diamond at the same point during dressing, but the small wheel will contact the work at position 2 and the size of the finished hole will be substantially smaller.

As the wheel wears, the point of contact between wheel and work will move gradually from position 1 down to position 2, and the size of the finished hole will become progressively smaller. This is one of the reasons that some internal grinders, when set up for diamond sizing, will not hold size during the life of the wheel. Many operators attempt to compensate for this error by constantly adjusting the diamond. The correct remedy would be to bring the axis of the work, the axis of the wheel and the diamond all into a common plane parallel with both traverse and cross feed ways. Finish size will then be correct regardless of wheel diameter.

Bryant Chucking Grinder Co. • Springfield, Vermont

FOR HOLE GRINDING

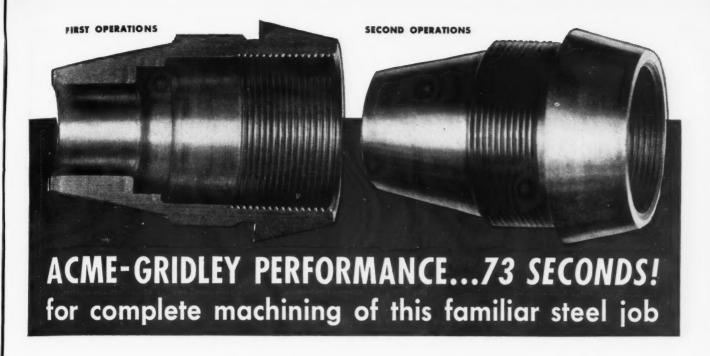




This massive machine will swing work up to 60" dia., making it ideal for large tool, die and bearing work. The workhead can be adjusted lengthwise so that minimum distance from workhead spindle flange to forward position of wheel slide is 24" and maximum distance is 44". To facilitate the grinding of large bores and faces or to obtain the proper crosswise position of the work when

the workhead is pivoted for taper grinding, the workhead is adjustable 16" forward and 14" to the rear from the center of the machine. The full 60" swing can be had when the workhead is adjusted to 30° for grinding a 60° included angle. The 9" spindle bore allows long work to extend back into it if necessary. Hydraulic controls help make the No. 1460 easy to operate. Write for details.

Bryant Chucking Grinder Company in Springfield, Vermont, U.S.A.



1. The first 15 operations are done on a $3\frac{1}{2}$ " six spindle Acme-Gridley	
Bar Automatic in	SECONDS
2. The secondary operations are done on a double indexing 8" eight	
spindle Acme-Gridley Chucking Machine (2 per cycle) at the rate of	SECONDS
Total multiple spindle machine time73	SECONDS

A $2\frac{1}{16}''$ Namco Collapsible Tap and a $3\frac{1}{2}''$ five chaser Vers-O-Tool, both with ground thread chasers, cut the smooth 12 NF class 2 threads.

Here is another outstanding example of the economies that result from studied tool engineering co-ordinated with time-proved machine design—a combination for which The National Acme Company is justly famous. Again we say:

No other source offers a line so complete — so much design and tooling experience in multiple and single spindle bar and chucking automatics — more than 45,000 machines built.



Whether for defense or civilian production, it will pay you to ask for Acme-Gridley's production figures on the work you are doing or contemplate. Send prints or samples.

The NATIONAL ACME CO.

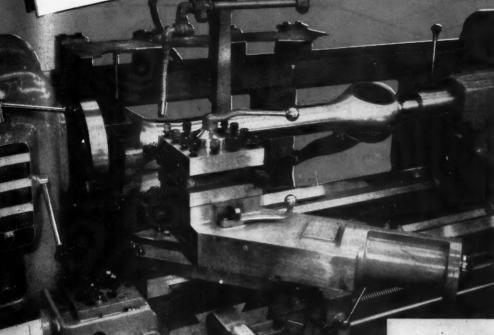
170 EAST 131st STREET . CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics:
1-4-6 and 8 Spindle • Hydraulic Thread
Rolling Machines • Automatic Threading Dies
and Taps • The Chronolog • Limit, Motor Starter
and Control Station Switches • Solenoids
Centrifuges • Contract Manufacturing



RB&W 107 YEARS MAKING STRONG THE THINGS, THAT MAKE AMERICA STRONG

2 hrs. versus 9/2 hrs.





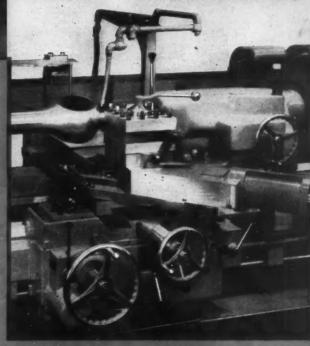
This marine Diesel engine connecting rod is now roughed and finished from the rough forging in exactly 2 hours. It formerly required $9\frac{1}{2}$ hours to do the same job.

With production costs constantly reaching new peaks, industry simply can't afford to ignore such savings from modern equipment. Where else could such a magnificent return upon an investment be secured, and how else can costs be lowered to meet an increasingly competitive market?

More production per man hour is the answer and the only answer to prohibitive costs—modern, high production machinery is the answer to greater production per man hour.

The astounding saving on this connecting rod job is the result of transferring it from previous equipment to a new 32-inch "AMERICAN" Hydraulic Duplicating Lathe. Such savings as this are not the exception but the rule when "AMERICAN" Duplicators are put on the job.

Bulletin No. 35 shows many such examples—it's yours for the asking.



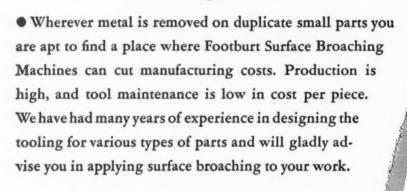
THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio U.S.A.

Lathes and Radial Drills

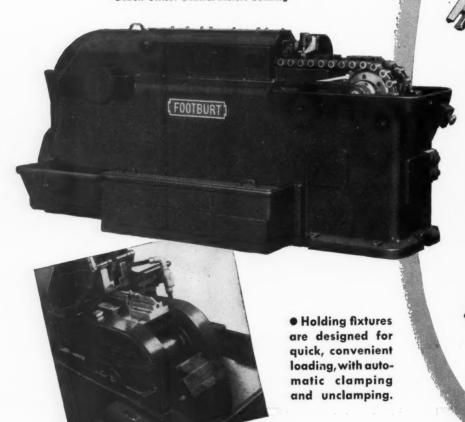
COST REDUCTION thru faster,

continuous broaching of multiple parts



THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building



FOOTBURT

72—MACHINERY, August, 1952



The Greer Accumulator, a simple invention utilizing Boyle's Law, is revolutionizing the design of equipment for production and defense.

Presses that formerly required 50 hp motors now operate more efficiently and economically with $1\frac{1}{2}$ hp motors and Greer Accumulators. A manufacturer of large drills reduced work spoilage 241/2 % by installing Greer Accumulators on his production equipment.

Greer Accumulators enabled a die casting equipment manufacturer to use 15 hp motors to do a 45 hp job and to reduce floor space by 32 sq. ft. per machine.

We offer you, without charge, the experience gained in hundreds of different Greer Accumulator applications to help you reduce the cost and increase the efficiency, dependability, and performance of your equipment.



Greer Bulletin 301 illustrates the use of Greer Accumulators as an auxiliary source of power in intermittent duty systems, for leakage-volume pressure compensation, as an emergency power source, for operating secondary circuits, for absorbing shocks, and other applications. Send for your copy today.



GREER HYDRAULICS, INC. 462 18th Street · Brooklyn 15, N. Y.

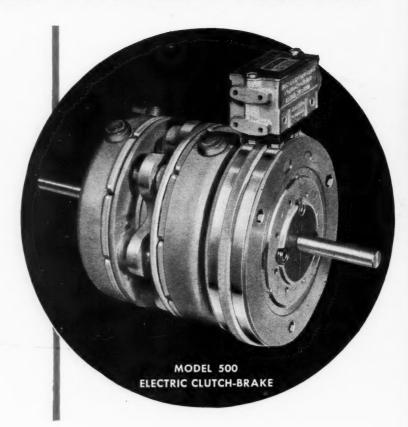
Sales Representatives in Principal Cities District Office: 407 So. Dearborn St., Chicago 5

MACHINERY, August, 1952-73

Warner Electric Clutch-Brakes provide split-second, intermittent cycling of Hautau-Turndex automation machines

WARNER electric motion control

- accelerates and decelerates master cam in less than 1/10 second
- provides shock-free movement—no abrupt starting, stopping or catapulting action
- permits automatic or manual control of index cycle
- accurately positions cams for constantly precise table indexing



DEVELOPING machines for tomorrow's "automatic factories," design engineers are finding Warner Electric Clutches and Brakes offer new, important design opportunities because of the ease and efficiency with which they control power transmission by remote, mechanical, hydraulic, electric or electronic means. A good example is this engine-block transfer machine that "automates" a right angle, 180° tip-over production line. Compound motion is provided by a packaged, cam-actuated indexing table. The model 500 Warner Clutch-Brake provides split-second, intermittent cycle control of the master cam, automatic or manual control of the

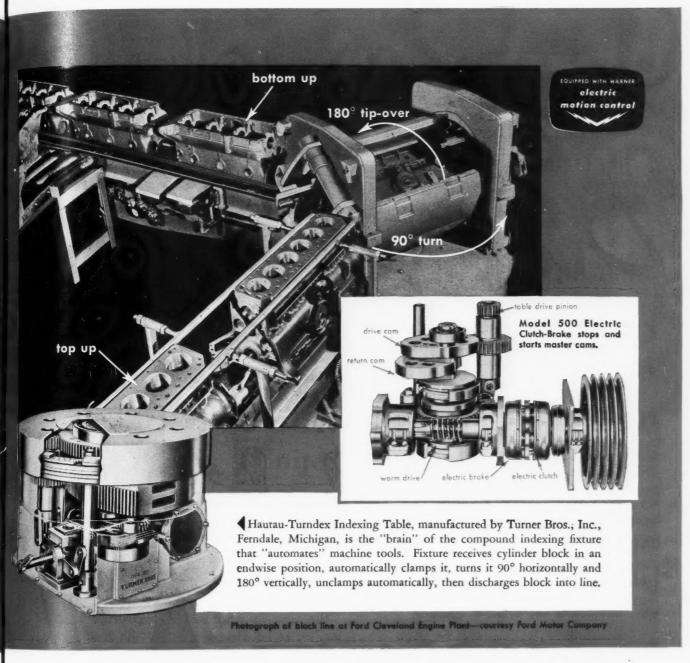
index cycle. It locates the cam with unvarying precision for each index—accelerates and decelerates it in less than one-tenth of a second. There is no abrupt starting, stopping or catapulting action. Result is a combination of accuracy, speed, smoothness, power and versatility never before achieved. Maximum engine block production is obtained by complete mechanical handling cycle of only 1½ seconds!

If you have a clutching, braking, tensioning, indexing or speed control problem, investigate the new, automatic features and advantages of Warner electric motion control!



ELECTRIC BRAKES & CLUTCHES

FOR INDUSTRIAL APPLICATIONS



Warner Electric Brakes, Clutches and Clutch-Brakes give you new, unique simplicity of design and operation. There are only two main parts, an armature and magnet. Operation is by electro-magnetic, instantaneous engagement and release of friction surfaces. Torque ratings are extremely high for small size and light weight. No coasting or slipping when "locked in." Easily designed into original equipment. Readily adapted to automatic cycles and remote control by limit switches, relays, electric-eyes, pushbuttons, etc.

Rate of application accurately controlled to synchronize motions—give exact degree of speed and power required.

offers complete application and design engineering service and field assistance. If you have a clutching, braking, tensioning, indexing or speed control problem, consult competent, experienced Warner brake and clutch specialists for reliable recommendations on torque, heat, electrical controls, capacity, etc.



FREE DEMONSTRATION

Test the high torque, instant speed and ease of control of electric brakes and clutches right on your desk top. Paste coupon to letterhead or 2 cent postcard and mail today for demonstration.

Warner Electric Brake & Clu	tch Co., Dept. M Beloit, Wis.	OUR 25th YEAR
Please send your FREE Bulletin No. 703-A. Have your representative call to discuss my problem. Firm Name		
Individual	Title	
Address		
City	State	



STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.



from

United Engineering & Foundry Company

"In this day of high corporate taxes with their adverse effect on retention of earnings, company executives responsible for expenditures for replacements require confidence in replacement analysis.

"The United Engineering and Foundry Company of Pittsburgh, Pa., has for many years had a policy requiring an analysis of replacement problems for submission to management with replacement appropriation requests. This policy has been strengthened through the adoption of the M.A.P.I. formula, which lends confidence to decisions based on the results of such analysis.

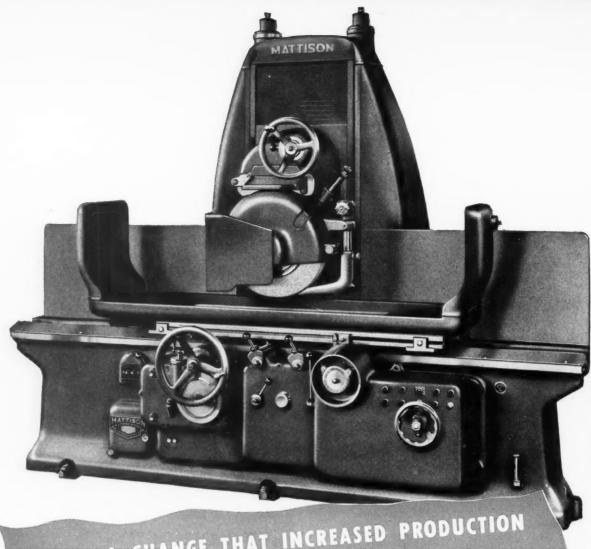
"The United Engineering and Foundry Company endorses the M.A.P.I. statement: 'Without a good analytical technique for individual replacement situations, no amount of system and organization can produce satisfactory results.'"

G. G. BEARD

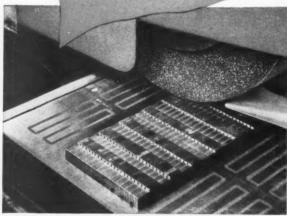
Executive Vice President

United Engineering and Foundry Company

ROCKFORD INSERT GROUP Keep Gathering Metal-Working Production Ideas...Be Well Informed When The Time For Replacement Arrives



HERE'S A CHANGE THAT INCREASED PRODUCTION FROM 30 PER HOUR TO 200 PER HOUR



Both sides of type-stamps are now ground 200 per hour on a Mattison Grinder. Previous production—30 per hour.

Because of the greater load and grinding area of their Mattison High Powered Precision Surface Grinder, Geo. T. Schmidt, Inc., Chicago, Illinois have been able to effect considerable savings in grinding time over their previous method. As an example—the type stamps shown in the picture above were formerly ground a few pieces at a time on a small grinder—30 per hour. The Mattison Grinder they are now using provides larger table space and a larger grinding wheel together with the necessary power and stability to permit the grinding of more pieces per load at a production rate of 200 per hour. Similar results are obtained on other parts.

Mattison High Powered Precision Surface Grinders have the high power and rugged double-column construction for rapid stock removal and the precision necessary for high quality finish and accuracy to close limits.

This combination not only will enable you to step up production on small parts, but permits grinding large work which previously could not be handled. For further information send for free circular.

MATTISON

MACHINE WORKS

ROCKFORD - ILLINOIS

MADE IN

ROCKFORD... MACHINE TOOL SHOPPING CENTER

ILLINOIS, U.S.A.

Machinery, August, 1952



re

in

0

REDUCE MACHINING COSTS, WORK-HANDLING...



on pieces like this!

With BARNESDRIL Unit-Machining

Figure the number of machining operations required—and the number of times you must move the workpiece to accomplish this—then you will see the efficiency and savings resulting when BARNESDRIL Unit-Machining combines both in one single automatic cycle.

Straight-line conveyor, transfer-type or simultaneous multiple operations—machined on rotary index, drum or lateral index fixtures — give you this efficiency by eliminating work transfer-time and the labor of moving the piece.

Operations are automatic and machine movements controlled hydraulically.

Step-up your efficiency and cut costs through BARNESDRIL Unit-Machining on your multiple operations drilling, tapping, reaming, boring, facing and chamfering. Call a BARNESDRIL Engineer today and ask him for estimates and machine specifications on your production.

attison

It, Inc.,
savings

mple —
ground

The
e space
power
load at
otained

rapid finish

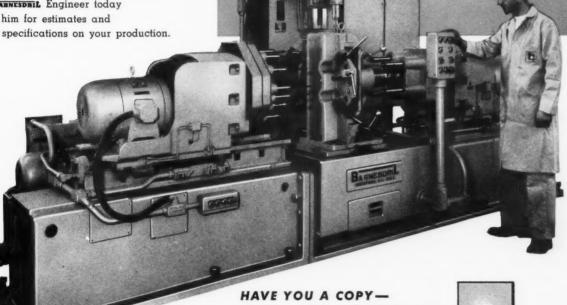
luction

viously

or free



This BRENESDEL 4-way Unit-Machine drills, rough bores, faces and chamfers this flywheel housing at the rate of 35 complete pieces per hour.



of this new Bulletin B-150, describing BARNESDAIL Production-Units, their application and types of work-handling fixtures. Write for a free copy on your letterhead!



BARNES DRILL CO.

BARNESDRIL

820 CHESTNUT STREET - ROCKFORD, ILLINOIS

ROCKFORD

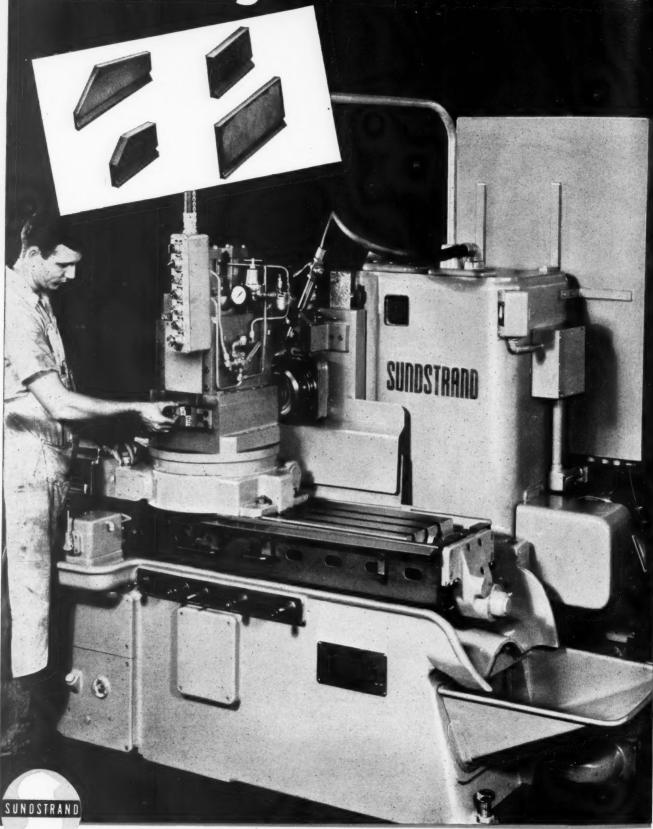
MADE IN

ROCKFORD MADE MEANS PRECISION MADE...ROCKFORD

Machinery, August, 1952

ILLINOIS, U.S.A.

Milling Production



RIGIDMILS

AUTOMATIC LATHES

HYDRAULIC EQUIPMENT

MADE IN

ROCKFORD... FOR ACCURATE, FAST METAL REMOVAL

ILLINOIS, U.S.A.

Markings August 1012



Increased 6 Times...

On a **SUNDSTRAND**Rigidmil with Automatic Index Base

The Wetmore Reamer Company uses a Sundstrand model 33 Rigidmil to mill the cone angle and top of high speed steel reamer blades. Because of the power and rigidity of the Sundstrand Rigidmil the rate of feed has been increased 4 times over former method. Also with the new method of holding, 17 blades are milled in one pass as compared to 11 by the former method. In addition, use of an automatic index base and a power fixture provides free loading time and faster and easier operation.

Features that Make Rigidmils More Productive

Over the past years there has been a constant improvement in productive design features on Sundstrand Rigidmils. These improvements are the result of our close work with industry in building efficient cost-cutting machinery to meet the ever present demands for progress. Some of the more important design improvements in Sundstrand Rigidmils are listed below. Check these against your present milling equipment.

1. Wider Speeds

Every Rigidmil has a wide selection of feed rates to accommodate various types of metals.

2. Wider Range of Feeds

to meet most production requirements in all types of metals.

FREE Additional Data

This book will give you many suggestions for production milling methods. Standard, semi-standard and special machine applications to milling problems are described in detail. Write for your copy today. Ask for bulletin 622.



3. Larger Quills

are provided to facilitate carbide milling with greater horsepower.

- 4. Heavier Heads For Greater H.P. and to maintain greater accuracy at high pro-
- 5. Larger Working Areas to hold more parts or longer parts in one cycle.
- 6. Better Materials used throughout all Rigidmils.
- 7. Hardened Steel Ways to insure consistent accuracy in machining.
- 8. Climb Milling
 to accommodate cycles where loading and unloading can be done while milling.
- 9. Automatic Lubrication to cut down maintenance costs, simplify operator's duties.
- 10. Fast Rapid Traverse to minimize non-cutting time of machine.
- 11. Larger Coolant Supply to accommodate long periods of production machining.
- 12. Automatic Cycles

to minimize operator's duties and facilitate production milling

SUNDSTRAND

SUNDSTRAND

Machine Tool Company

2530 Eleventh St. Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES



MADE IN

FOR METAL REMOVAL WITH ACCURACY AND SPEED...ROCKFORD

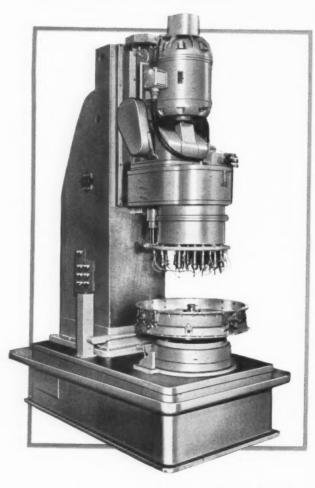
Machinery, August, 1952

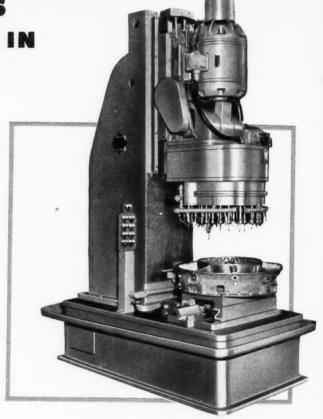
ILLINOIS, U.S.A.

Rehnberg-Jacobson

INGENIOUS MACHINES
TAP A LOT OF HOLES IN
JET ENGINE PARTS...

When a well-known jet engine manufacturer inquired of Rehnberg-Jacobson about a tapping machine, they got more than they expected. Originally asking for means to tap a few holes, they wound up with the two machines shown here — which tap a total of 73 holes. R-J sales engineers, seeing an opportunity, had suggested some ingenious combinations of spindles and index. Result: two machines that provide substantial production-cost savings for the customer... a common characteristic of R-J machines, by the way.





ABOVE. Part: Front compressor frame for jet engine; material, magnesium. Machine: Vertical type, with No. 70 R-J Screw Feed Unit (modified to provide rapid traverse only) driving 27-spindle tapping head with individual lead screw on each spindle. Operation: Screw Feed Unit rapid traverses down against positive stop, two holes are tapped as balance of tools clear, motor reverses to extract taps; on automatic cycle, work table moves 3" sideways by air cylinders; 25 holes are tapped as two tools clear, taps are reversed and extracted, and unit rises by rapid traverse to permit unloading. Capacity: Rating, 15 pieces per hour.

LEFT. Part: Same as above, but turned over. Machine: Similar to above, except table has manual rotatable 180° index, and head has 23 spindles. Operation: Screw feed unit rapid traverses down against positive stop, 21 holes 1/4"-20 and 5/16"-18 are tapped in proper pattern on 3 concentric radii plus two odd holes on edge; taps retract and unit holds while operator manually indexes piece 180°; tapping operation repeats for a total of 46 holes in symmetrical arrangement, taps are extracted, and unit rapid traverses up for reloading. Capacity: Rating, 15 pieces per hour.

REHNBERG-JACOBSON MFG. COMPANY

DESIGNERS & BUILDERS OF SPECIAL MACHINERY



2135 KISHWAUKEE ST. ROCKFORD, ILLINOIS

MADE IN

ROCKFORD... MACHINE TOOL PLANTS CLOSE TO YOUR PLANT

ILLINOIS, U.S.A.

Machinery, August, 1952



DISTORTION

REDUCED ..

PRODUCT QUALITY IMPROVED

with a ...



Clean hardened, approx. 200 per load, in one hour at 1600° F. Clean threads maintained, rethreading operation eliminated. Wt. per piece — .37 lbs.

SAE-1095 TRIGGER SPRING

Clean hardened, 350
per load, in 30 minutes
at 1500° F. Distortion reduced, cleaning operation eliminated, Wt. per piece — .19 lbs.



SAE-1045 HITCH HOOK

Clean hardened, 60 per load, in one hour at 1600° F. A scale-free and a more rust resistant

finish is produced, cleaning operation eliminated. Wt. per piece — 4 lbs.

SOFT-CENTER STEEL JOINTER BLADE

Clean hardened, 69 per load, in one hour at 1625° F. Distortion reduced, cleaning and buffing eliminated. Wt. per plece — 3.1 lbs.





Ipsen T-250 Heat Treating Unit in large Farm Equipment plant. Operator simply loads the unit and sets the heat treating cycle. Work is handled through heat and quench (or cooling) cycle automatically. Change-over from one job to another is fast and simple.

NEW PSEN STANDARD AUTOMATIC HEAT TREATING UNIT

Described at left are typical results obtained by a Farm Machinery Manufacturer in clean hardening more than 50 different workpieces on a production basis in an Ipsen Automatic Heat Treating Unit. Controlled, automatic batch processing from heat through quench, combined with sealed atmosphere operations, have also effected important improvements in product quality. For example, highly uniform results are now obtained from load to load which permits more accurate control of wear. Also clean, scale-free, more rust-resistant work is obtained. Further, distortion is held to close limits, which not only speeds production but also simplifies assembly and field service problems.

Bright Carbonitriding Cuts Processing Time 75%

In addition, 15 different workpieces requiring case depths ranging from .015 - .035" are also automatically processed in the Ipsen. On these jobs, the Ipsen exclusive bright carbonitriding process is employed. This method cuts processing time as much as 75%, and improves delivery schedules. Workpiece distortion is also accurately controlled, and extra handling and cleaning operations are eliminated. In use for more than nine months, the unit has operated on a 24 hour schedule, with no downtime for maintenance.

Write FOR MORE FACTS TODAY — Get the complete story on modern Ipsen Heat Treating Units today. Three standard sizes are available — from 250 to 600 lb. capacities. Write for free data sheets describing and illustrating results and procedures on actual jobs.



IPSEN INDUSTRIES, INC., 717 South Main Street, Rockford, Illinois

Production units for CARBONITRIDING · CARBURIZING · HARDENING · BRAZING · MARTEMPERING



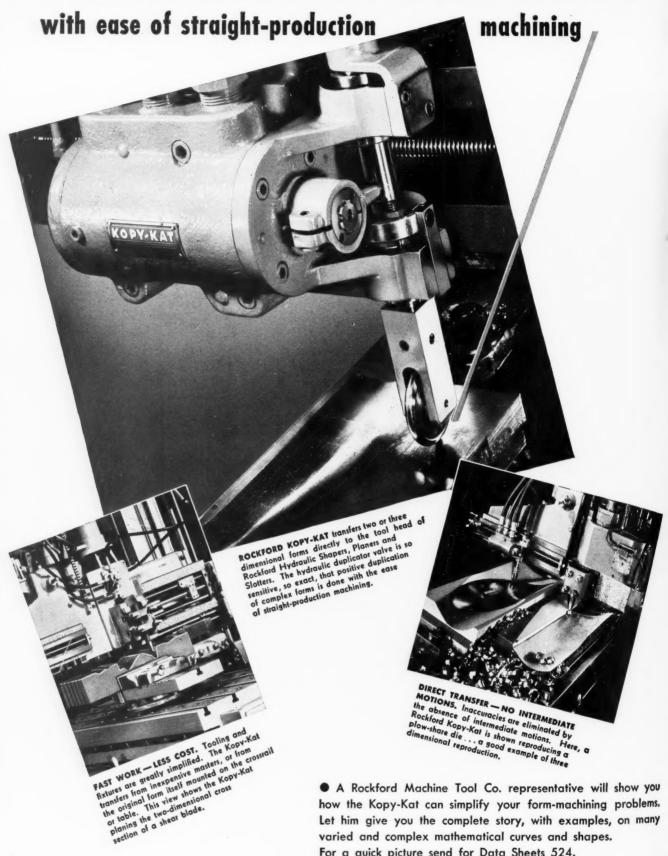
MADE IN

CENTER OF MACHINE TOOL EXCELLENCE...ROCKFOR

Machinery, August, 1952

ILLINOIS, U.S.A.

DUPLICATES FORMS DIRECTLY!





For a quick picture send for Data Sheets 524.

3500 KISHWAUKEE STREET . ROCKFORD, ILLINOIS

MADE IN

Hy-Draulic

ROCKFORD... FOR MACHINES DESIGNED TO SUIT YOUR PRODUCTION

ILLINOIS, U.S.A.

Machinery, August, 1952



Before Designing Hydraulic Machines

Check these TWO methods

of Obtaining Circuits ...

METHOD ONE

DESIGN YOUR OWN CIRCUITS....

Unless you have highly trained hydraulic engineers in your plant, it is costly and dangerous to design your own hydraulic circuits.



METHOD

HAVE BARNES DESIGN YOUR CIRCUITS ...



Hydraulic problems sub-mitted to Barnes are not placed with one or two engineers, but with a staff of experienced hydraulic specialists. Barnes engineers first study the application outlined. The correct hydraulic circuit is then designed to suit your job.

ORDER PUMPS, VALVES, ETC., FROM SEVERAL SOURCES ...



When making selection of these elements from various catalogs and data sheets, many chances are taken in

obtaining parts which can be easily assembled and made to function successfully as a complete circuit.

HAVE BARNES FURNISH ALL PUMPS, VALVES, CYLINDERS, ETC.

All Barnes hydraulic circuits are made up of Barnes elements. Pumps, cylinders, valves, reservoirs and piping come from a single source . . .

the Barnes plant. Complete circuits and units are shipped, tested and ready to assemble to your machine. Simple pipe connections from unit to cylinders are all that need be made.

DIVIDED SERVICE RESPONSIBILITY



Unless the foregoing two functions have been completed successfully, the final circuit will not operate properly . . . service responsibility is difficult to determine.

UNDIVIDED SERVICE RESPONSIBILITY ...



Responsibility for operation rests with Barnes alone. Barnes guarantees the application as well as all hydraulic elements.

Capable service engineers are your assurance of a trouble-free hydraulic circuit. There is no division of responsibility.

John S. Barnes Corporation ROCKFORD, ILLINOIS



you ems.

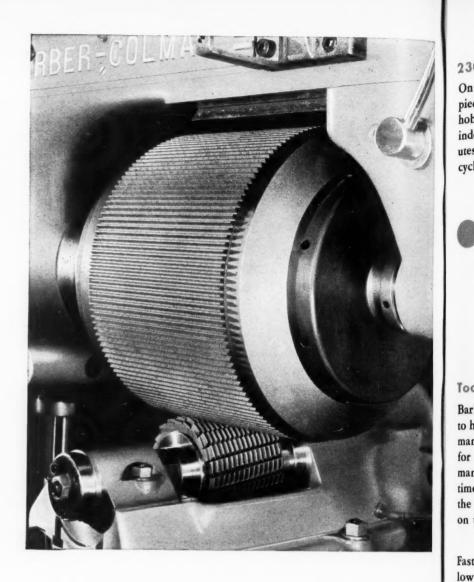
nany

MADE IN

YOU'LL FIND YOUR PRODUCTION MACHINE TOOLS IN...ROCKFORD

Machinery, August, 1952

ILLINOIS, U.S.A.



On

hob

ble

of t allo whi tool

Bar

men

HOE

HOE

HOB

Barber-Colman Hobbing Boosts RING GEAR PRODUCTION!

1 Gear Every 1-1/2 Minutes

This Barber-Colman No. 14-15 Hobbing Job is typical of how Engineered Hobbing pays off on gear production problems. These flywheel ring gears are nearly 15" in diameter, with 146 teeth and .375" face width. They are hobbed 24 per load at the rate of 36 minutes floorto-floor, or 1-1/2 minutes per gear. Blanks are formed by rolling flat stock into a ring and butt-welding. The rings are then mounted on specially-designed work arbors and hobbed at .100" feed per revolution and 75 hob rpm.

0 F PREGISI

MADE IN

ROCKFORD... A CONVENIENT SOURCE FOR PRODUCTION NEEDS

ILLINOIS, U.S.A.

Machinery, August, 1952



2300 Gears Per Hob Life

On this job 2300 gears are cut per hob—about 195 pieces per sharpening. Low-cost unground Multithread hobs are used. Multithread design, with its increased indexing speed, has reduced total time to 1-1/2 minutes per gear. Fast loading and automatic hobbing cycle reduce operating costs to a minimum.

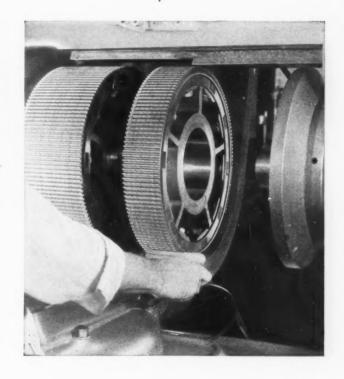
ENGINEERED HOBBING PAYS OFF!



Tooling Suits Specific Problems

Barber-Colman Engineers designed special mandrels to hold 8 of these large diameter blanks per load. The mandrels are mounted three on the arbor (24 blanks) for each cutting cycle. Blanks are pressed onto the mandrel prior to hobbing, thus reducing loading time between cycles. A special loading fixture aids the operator in lifting and positioning the mandrels on the arbor.

Fast, accurate gear hobbing — with tool costs far below comparable methods — gives you the best possible approach to high-production gear output. Rigidity of the Barber-Colman No. 14-15 Hobbing Machine allows the use of high feed rates and the fast indexing which is inherent with Multithread hobs. Special tooling eliminates job kinks and difficulties. Let Engineered Hobbing work for you, too. Call your Barber-Colman representative and ask him for recommendations on your gear cutting operations.



HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

Engivheel

face

floorg flat

d on revo-

R



Barber-Colman Company

GENERAL OFFICES AND PLANT, 628 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

HOBS AND MACHINES SINCE 1911



MADE IN

FOR PRODUCTION MACHINE TOOLS IT'S...ROCKFORD

Machinery, August, 1952

ILLINOIS, U.S.A.

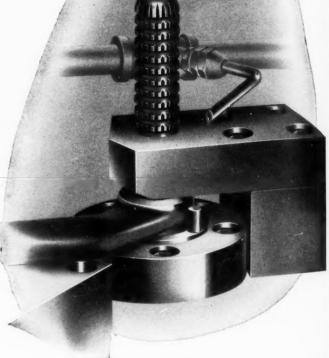
broaches and swages more than 160 par per hour

Accuracy and power combined on an American 25 ton press—

Broaches 32 serrations in a %" diameter hole in a Pitman arm.

Swages the serrations to a ¾" taper per foot.

Your next broaching problem can be solved more economically by broaching the American Way . . . because American designs and builds all three . . . broaches, machines and fixtures. To start American engineers working on your problem, send a partprint or sample and hourly requirements. Write today for Circular No. 300.





The broaching stroke is started by manual control. The broach and swage assembly is held in accurate alignment by twin guide posts built integral with the broach push head. The 32 serrations are broached and then swaged under 25 tons pressure in one pass. On the return stroke, the broach is stripped from the part by a plate in the fixture.



AMERICAN A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

See American First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



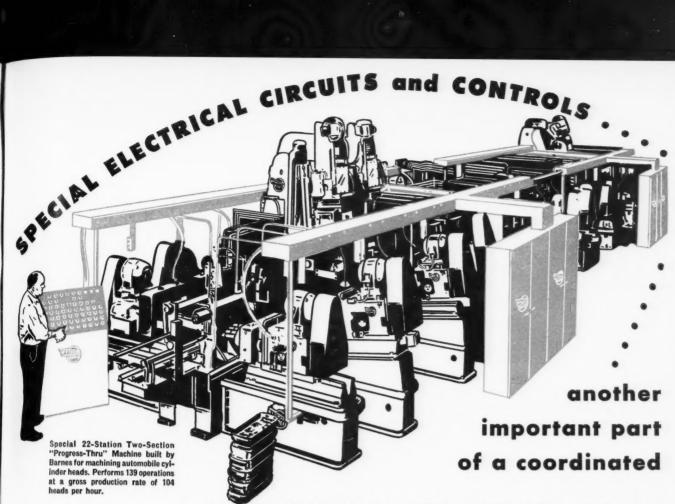
MADE IN

ROCKFORD...city of machine tool specialists

ILLINOIS, U.S.A.

Machinery, August, 1952





6-POINT MACHINE TOOL BUILDING SERVICE

BARNES SPECIAL MACHINE TOOL BUILDING SERVICE INCLUDES...

an

r

- P SPECIALIZED MANUFACTURING FAC-LITIES — 75 year background, large well equipped plant efficiently tooled to produce high production machines.
- 2 SPECIAL HYDRAULIC EQUIPMENT—
 designed and built to meet JIC standards.
 Individually engineered units assure smooth,
 dependable actuation for every requirement.
- 3 SPECIAL GAUGES, FIXTURES, TOOLS designed for each individual machining problem, assure accuracy of operations at high production, speeds
- 4 SPECIAL ELECTRICAL EQUIPMENT and CONTROLS as illustrated above.
- 5 SPECIAL HANDLING AND CONVEYOR EQUIPMENT designed and built to reduce work handling, effect maximum safety and efficiency.
- 6 COORDINATED DESIGN AND ENGINE-ERING — Mechanical, Hydraulic, Electrical, Process, Tool, and Fixture Engineers work together at Barnes. Team-work solves complex problems quickly.

by W. F. & JOHN BARNES

Designed and Built to Simplify Operations

Providing special electrical circuits and controls is another important part of the coordinated 6-point machine tool building service rendered by Barnes. The example shown above partially illustrates how this equipment is assembled to provide easy maintenance, maximum safety, and simplicity of operation. Inter-locking circuits make the sequence of operations automatic, fast, and sure. Safety devices are incorporated to suit each job which detect and signal danger conditions and prevent costly repairs of machine or tools. Controls are provided which minimize human effort. Separate control stations permit individual head operations to speed tool changes. Wiring is according to JIC standards.

Undivided Responsibility Assures Better Service

Because all planning, engineering, and manufacturing efforts at Barnes are closely coordinated, you get a complete machine tool building service all from one convenient, dependable source. Broad, varied engineering experience and creative skills have been developed over the years which enable Barnes to help you solve many troublesome production problems. If your present or future machining needs call for faster, more efficient methods, we will be glad to work with you as rapidly as current conditions will permit.



ND

Write for Free Data Ask for free booklet "Coordinated Machine Engineering" describing the scope of Barnes machine tool building service. Illustrates and describes modern machines and mass production techniques.

W. F. & JOHN BARNES COMPANY 310 S. WATER ST., ROCKFORD, ILLINOIS



MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES - AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES



MADE IN

YOU'LL FIND YOUR PRODUCTION MACHINE TOOLS IN...ROCKFORD

Machinery, August, 1952

ILLINOIS, U.S.A.

Versatility and Quick Change-Over on a wide range of work...



GREENLEE

Automatics

When our reporter visited the busy shop shown above, he found that the battery of four GREENLEES was used mostly in making parts for *DAS* Unions - a specialty product of the concern. These unions are low-cost pipe fittings, featuring a pressed-insert bronze seat, that will hold pressures up to 300 psi for steam and 750 psi for water. (This high capacity permits distributors to minimize their number of items for a wide range of requirements.) The concern also does a great deal of jobbing work, much of which is now "classified". Owners and operators alike expressed their satisfaction with GREENLEE machines and service, also indicating the GREENLEES are "easier to work on". With their quick changeover features, the GREENLEES are an important factor in holding down costs on the component parts required for the *DAS* Union line.

GREENLEE BROS. & CO.

1868 MASON AVE., ROCKFORD, ILLINOIS



Production-line tooling data for the seat end of a 3/4" =DAS+ Union, as run on a 15/8" Greenlee Six-Spindle Automatic, is as follows:

osition	Cross Slides	Main Tool Slide
1	Rough Form	Form Drill 13/6" dia.
2	Finish Form	Drill 1/8" dia.
3	Knurl	Form Ream
4		Thread 11/2" OD
5	Break down part way for cut-off	Tap 3/4" pipe thread
6	Cut off	
vele Tin	ne - 14 sec.	Production —

— 14 sec. 257 pcs. per h



MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES . AUTOMATIC SCREW MACHINES ... AUTOMATIC TRANSFER PROCESSING MACHINES

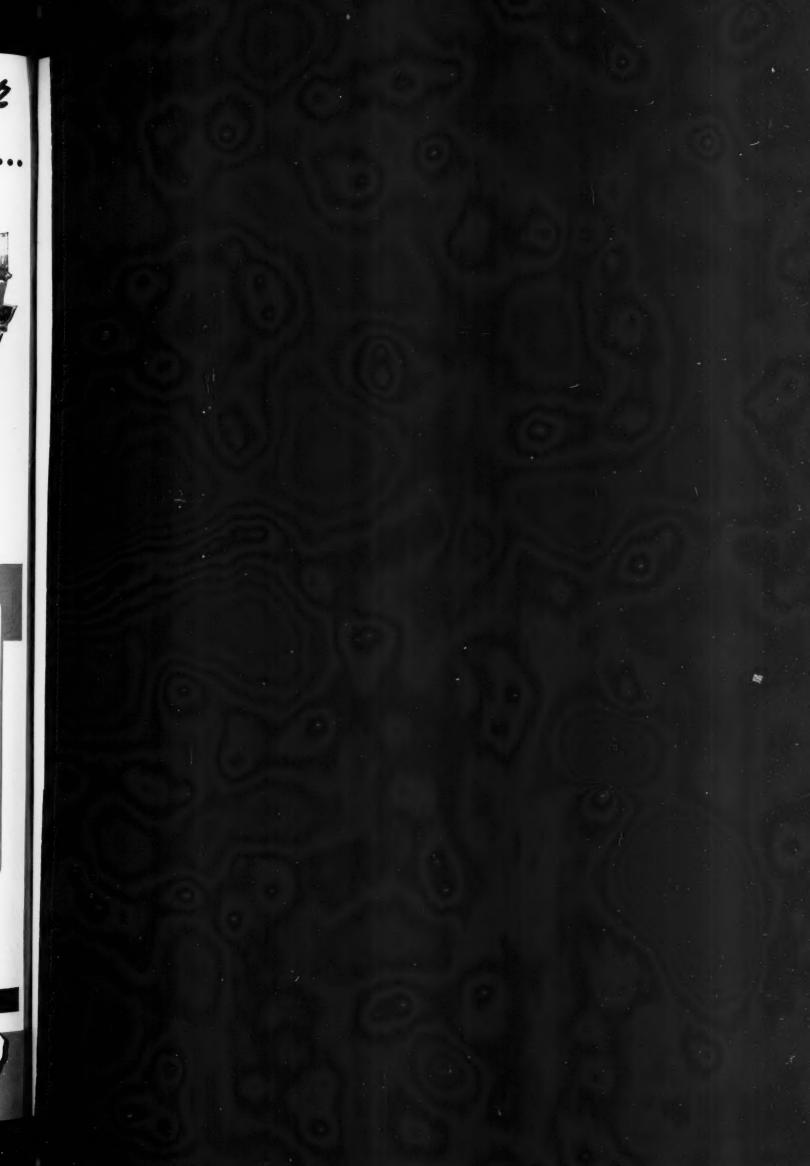
MADE IN

ROCKFORD... A CONVENIENT SOURCE FOR PRODUCTION NEEDS

ILLINOIS, U.S.A.

Machinery, August, 1932







Which soils are hardest to remove?

WHAT METALS
DO YOU
CLEAN?

Some good things to know about to know about Metal Cleaning Metal

☐ buffing compound residues

☐ pigmented drawing compounds

oils and greases

☐ heat scale

☐ tarnish

☐ rust, oxides

☐ carbon smuts
☐ flux residues

☐ rust preventives

from

☐ steel ☐ brass

copper

☐ zinc

□ lead

☐ aluminum

magnesium

Can you electroclean brass without tarnishing? Do you find buffing compounds or carbon smuts hard to remove? Would you like to remove rust and oil in one cleaning operation? —You'll find real efficiency and economy in Oakite methods for metal cleaning. Tell us your problem and let us send you the FREE booklet.

Technical Service Representatives Located in Principal Cities of United States and Canada

MATERIALS . METHODS . SERVICE

OAKITE PRODUCTS, INC. 18 Rector St., New York 6, N. Y.

Tell me (without obligation) about Oakite methods for removing the following soils from the following metals:

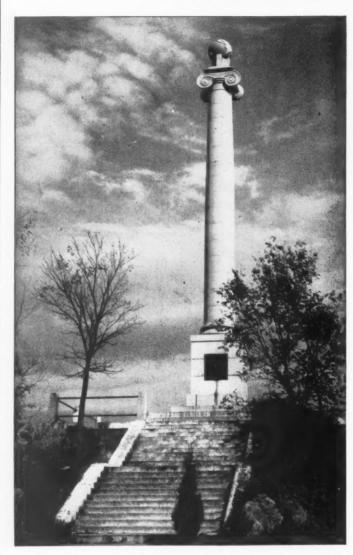
☐ ALSO send me a FREE copy of your booklet "Some good things to know about Metal Cleaning." Name_

· Company.

.Address

CUMBERLAND GROUND BARS

We manufacture 8" diameter, 7-1/2", 7", 6-1/2", 6", and also odd and intermediate sizes down to and including 1-1/8".



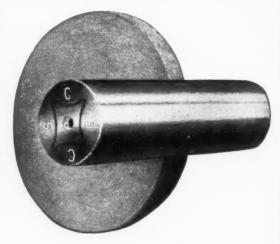
ON THE WEST VIRGINIA SHORE, OVERLOOKING THE POTOMAC RIVER, STANDS THE JAMES RUMSEY MONUMENT

> The first practical steamboat in the world was run on the Potomac River a few miles below Cumberland, Maryland.

> GEORGE WASHINGTON said in his diary, under date of September 6, 1784: "Remained at Bath all day and was showed the Model of a boat constructed by the ingenious Mr. Rumsey, for ascending rapid currents by mechanism; the principles of this were not only shown, and fully explained to me, but to my very great satisfaction, exhibited in practice in private under the injunction of secrecy-

> At a later date George Washington said in his diary: "Spent the afternoon with Mr. Rumsey and then Alexander Hamilton and I rode on to Cumberland, Maryland,

MBERLAND STEEL COMPANY



Symbol of Quality

Approximately 100 years after the exhibit of this steamboat, Cumberland began grinding bars. They found through experience this was the best method by which accurate steel bars could be produced. These bars are so carefully ground that they are adapted for mass production where gears, pulleys, sprockets and bearings must slide on the bars without delay due to filing or fitting.

IMMEDIATE BARS

fo

hig chr

clas inte

and car 30

bid

979

(a)

twe

pro

wif fai

air pre

are

gr

ter

801

ab

air

DISTRIBUTED BY

Baltimore, Maryland — Addison Clarke & Bro. Boston, Mass.—Hawkridge Brothers Company Bridgeport, Conn.—Hunter & Havens, Inc. Buffalo, N. Y.—Jos. T. Ryerson & Son, Inc. Cambridge, Mass.—Brown-Wales Company Charlotte, No. Carolina—Edgcomb Steel Co. Chicago, Ill.—Central Steel & Wire Co. Clincinnatl, Ohio—Jos. T. Ryerson & Son, Inc. Cleveland, Ohio—The Bissett Steel Company Detroit, Michigan—Central Steel & Wire Co. Fort Worth, Texas—C. A. Fischer Hartford, Conn.—Hunter & Havens, Inc. Indianapolis, Ind.—Tanner & Company Jersey Clty, N. J.—Jos. T. Ryerson & Son, Inc. Lakeland, Fla.—Mine & Mill Supply Co. Los Angeles, Calif.—Link-Belt Co., Pacific Div. Louisville, Ky.—Neill-LaVielle Supply Co. Martinsburg, W. Va.—W. H. Heiston & Son Milwaukee, Wis.—Central Steel & Wire Co. Montreal, Canada—Drummond, McCall & Co., Ltd. New Orleans, La.—R. J. Tricon Co. New York City, N. Y.—Bright Steel Corp. Oakland, Gallf.—Link-Belt Co., Pacific Div. Philadelphia, Pa.—Charles Bond Company Philadelphia, Pa.—Horace T. Potts Co. Pittsburgh, Pa.—McKee-Oliver, Inc. Portland, Maine—W. I. Blake & Company Portland, Oregon—Link-Belt Co., Pacific Div. Spotkane, Wash.—Link-Belt Co., Pacific Div. Seatle, Wash.—Link-Belt Co., Pacific Div. Seotkane, Wash.—Link-Belt Co., Pacific Div. Spotkane, Wash.—Link-Belt Co., Pacific Div. Spotkane, Wash.—Link-Belt Co., Pacific Div. Spotkane, Wash.—Link-Belt Co., Pacific Div. Toronto, Canada—Drummond, McCall & Co., Itd. Worcester, Mass.—Pratt & Inman

CUMBERLAND, MARYLAND, U. S. A. ESTABLISHED 1845 **INCORPORATED 1892**

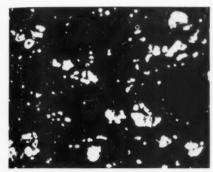
Tool Steel Topics



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

cific Coast Bathlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Expart Distributor: Bethlehem Steel Expart Corporation

Ten Times More Necktie Clasps with Hobbed Molds of Duramold A



The white particles are extremely hard carbides which are distributed throughout this hardened structure of Lehigh H, enlarged 500 times in this micrograph.

These Two Carbide Steels for High Wear-Resistance

We're talking about Lehigh H and Lehigh S, two of our high-earbon, high-chromium grades of tool steel. Both are classed as carbide steels because they're intermediate between low-alloy tool steels and sintered carbides.

Lehigh H contains about 20 pet of carbide by volume, and Lehigh S about 30 pet. It's this high percentage of carbides that makes them wear and wear, even on severe jobs.

In actual service, the "soft" material (around Rockwell C-60) wears out between the carbides, leaving the carbides protruding just like individual stones in a cobblestone street. Lehigh H and S, with their abundance of hard carbides, far outwear lower-alloy tool steels.

Lehigh H is the most popular type of air-hardening tool steel where maximum production and freedom from distortion are essential. It's the general-purpose grade. Lehigh S has a higher carbon content to provide still greater wear, but at some sacrifice of shock-resistance.

Lehigh H is stocked in our mill depot in a wide range of sizes. It's also available from local stocks of Bethlehem tool steel distributors in principal cities.

Like to know more about these longwearing die steels? Write us for Booklet 262. It gives details of both our oil- and air-hardening grades. Address your request to Publications Department, Room 1040, Bethlehem, Pa. Here's another enthusiastic report on Duramold A, our 5 per cent chromium, air-hardening hobbing steel. Hobbed for zinc die castings, this special-purpose steel has upped the life of molds by at least 1000 pct, according to Peerless Engineering Co., Inc., South Gate, Calif. In the casting of novelty necktic clasps, the die sets of Duramold A were examined at a time when previous molds had to be discarded. The Duramold A cavities showed no evidence of checking or sinking; and the surface finish appeared to have actually improved with use.

M. T. Derby, chief tool engineer for Peerless, sums it up:

"We like Duramold A because it's easy to hob. In making multiple cavities we get good detail and accuracy with fewer machine-hours. For most of our work we need a steel that gives us a high polish in the cavities with a high hardness that will stand up under zine-injection molding at high pressures and temperatures. We've found Duramold A to have good core strength, it doesn't sink readily, and we can expect to get long runs with very little maintenance."

Whether used for die-casting or plastic-molding Duramold A is a real improvement over hard-to-hob steels. Its 5 pet chromium content provides plenty of wear-resistance and core strength . . . and its air-hardening properties hold distortion



Duramold A is hobbed in one push in a 300-ton press by the master hob shown at top. Eight necktie clasps are cast at one time, the molten zinc being injected at 800 F and 2000 psi; mold temperatures reach about 500 F.

to a minimum during heat-treatment. Its typical analysis:

 $\frac{C}{0.07 \text{ max}}$ $\frac{Mn}{0.40}$ $\frac{Si}{0.20}$ $\frac{Cr}{4.50}$ $\frac{Mo}{0.45}$

Booklet 271 will help you select the right tool steel—for hobbed molds, machine-cut molds, or master hobs. Address your request to our Publications Department, Room 1041, Bethlehem, Pa.



BETHLEHEM TOOL STEEL ENGINEER SAYS:

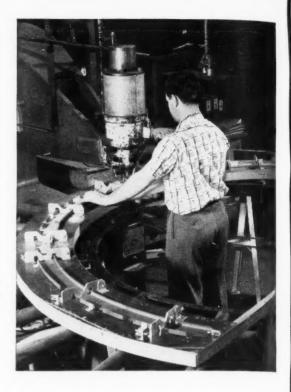
Here's why upset-forged discs are best for some tools

Like wood, steel has a grain. Tool steel discs which have been upset-forged have a grain-flow parallel to the disc face. When a disc is cut from bar stock, the grain flow is at right angles to the disc face. Before making tools from round discs, it's best to consider the importance of the direction of grain flow.

A milling cutter, for example, made from an upset-forged disc has a radial grain-flow in the cutting teeth. There's less chance of having these teeth break out than if the cutter were made from a disc cut from a bar.

Upset-forged discs are made by upsetting a piece of tool steel which is twice as thick as the desired thickness of the disc. This upset ratio of 2 to 1 should not be varied too greatly. A ratio of more than 3 to 1 will cause buckling during upsetting; less than 1.5 to 1 will not produce the desired flow lines of the grain.

Jigs and Fixtures are easier to machine-



easier to handle when made of Aluminum. Investigate the Substantial Savings possible with Alcoa Tool and Jig Plate.*

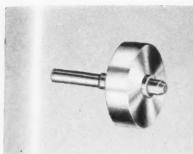
- >> Moderately priced.
- >> Strain relieved—machined both sides.
- >> Tolerances on plates of thicknesses from 1/2" to 4" held within \pm .010".
- >> Cut to any desired dimensions up to 48" x 96". Immediate delivery.

*For more information on Alcoa Tool and Jig Plate, contact your local Alcoa sales office ... or write ALUMINUM COMPANY OF AMERICA, 1951-H Gulf Building, Pittsburgh 19, Pa.

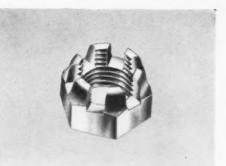
I LCO I



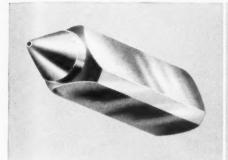
TOOL AND JIG PLATE







Better Finishes . . . Faster Speeds . . . or Fewer Rejects



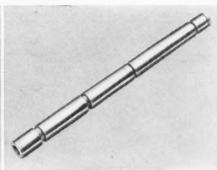




Reported on Each of These Jobs







produced from Carpenter Free-Machining Stainless

These are not unusual job records. The reason for performance records such as 10% faster machining and 5% to 8% fewer rejects is the *constant uniformity* of Carpenter Free-Machining Stainless. Every bar, on shipment after shipment of Carpenter Stainless, responds the same when it meets your cutting tools.

Under today's conditions, it is important that you get every possible finished part from the Stainless Steel you buy. To do that . . . to find new ways to turn Stainless jobs out faster and better . . . make use of the personal shop help your Carpenter

representative can give you. He will be glad to work with you and your men, to make his experience stretch the available supply of Stainless Steel.

Another help Carpenter can give you is useful information about machining Stainless. For example, the Carpenter "NOTEBOOK on Machining Stainless Steels" covers turning, drilling, reaming, lubrication, etc. If you would like a copy, just send us a note on your company letterhead, indicating your title. The Carpenter Steel Company, 105 W. Bern St., Reading, Pa.

Export Department:
The Carpenter Steel Company, Port Washington, N. Y. "CARSTEELCO."





takes the problems out of production

For Easy-to-Use Stainless Call Carpenter. Warehouses in principal cities throughout the country.

Among other obligations...

When an order is accepted the obligation to supply the commodity as stated in the contract is routine. But every purchaser knows that there are many other and additional services that the seller can render which serve the convenience and interests of the customers.

Along with every order accepted by the Bunting organization is also accepted the obligation to cooperate with the customer as well as to deliver the items as specified.

th:

oth

ga

Ask any Bunting customer.



THE BUNTING BRASS & BRONZE COMPANY . TOLEDO 1, OHIO . BRANCHES IN PRINCIPAL CITIES

GAGE USERS REPORT GRAPH-MO® OUTWEARS OTHER TOOL STEELS 3 TO 1!

Reports from gage users who have switched to Graph-Mo® steel gages show that Graph-Mo outwears other tool steels an average of three to one!

Graph-Mo wears better because it contains free graphite and diamond-hard carbides. This structure gives excellent resistance to abrasion and has minimum tendency to pick up, scuff, or gall. Tests on Amsler Wear Machine show Graph-Mo has twice the resistance to galling when compared with ordinary tool steels.

MACHINES FASTER

Constant Pressure Machinability tests show that Graph-Mo machines 30% faster than other tool steels. This is due to Graph-Mo's graphitic particles—a feature which is exclusive with Graph-Mo.



Measuring Graph-Mo steel master plug gage in 12-year stability test. Gage changed only 10 millionths.

GREATER STABILITY, TOO!

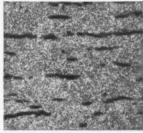
During a twelve-year period, the Timken Company measured at frequent intervals a typical master plug gage made of Graph-Mo. As shown by the figures below, the gage size at the end of that time measured within ten millionths of an inch of its original dimension.

1940-1.73996	1944-1.73996
1941-1.73995	1945-1.7 3995
1942-1.73998	1948-1.73997
1943-1.73997	1951-1.73995

You can always tell Graph-Mo by its "graphitic look"—the tiny, scattered, parallel marks barely visible on the surface of a piece of polished Graph-Mo. This built-in "trade-mark", the result of free graphite in its

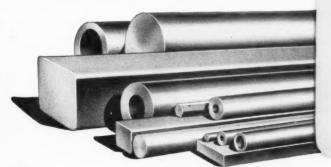
structure, can't be duplicated in other steels. Look for it, insist upon it, next time you buy gages.

For further information on Graph-Mo—a Timken graphitic tool steel—write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".



100X Photomicrograph shows graphitic particles in Graph-Mo steel.

YEARS AHEAD-THROUGH EXPERIENCE AND RESEARCH



TIMEN

TADE-MARK REQ. U.S. PAT. OFF.

Fine Alloy

STEEL



SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING



NICKEL-TIN BRONZE ... containing approximately 11/2% nickel, $10\frac{1}{2}\%$ tin, a maximum of 0.25% lead, the balance copper . . . is produced by several foundries for gear requirements of The Cleveland Worm and Gear Company of Cleveland 4, Ohio.

This company also uses Type 2317 (3½% nickel) carburizing steel for worms of large size, and Type 4615 (nickel-molybdenum) carburizing steel for the smaller sizes. Both of these steels are especially easy to handle in heat treatment, and consistently provide the hard surface and tough core so essential to efficient, long-lasting operation. Moreover, they withstand reasonably rapid grinding on automatic thread grinders without surface cracking or spalling.

steel worm, gives you gearing that actually im-

Many years ago, after considerable laboratory and actual field tests of various compositions, The Cleveland Worm and Gear Company ... specializing for the past 40 years in the production of speed reducers ... standardized on nickel-

Today, many of their drive units which were produced in the early days, are still operating regularly with the original worms and gears ... which means more than 30 years of useful

The reason for this long, trouble-free performance is not hard to find. For nickel improves the strength of standard bronzes and is particularly effective in raising elastic properties . . . increasing shock resistance as much as 25 to 50 percent.

Nickel-containing alloys may meet the exacting demands of your particular equipment or production problems. Write us, today, for counsel and data.

At the present time, the bulk of the nickel produced is being diverted to defense. Through application to the appropriate authorities, nickel is obtainable for the production of nickel alloyed bronzes for many end uses in defense and defense supporting industries.



THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET, N.Y.

Good Steel

1

MS

ve

rs

on

lloy

im-

OTV

ons,

uc-

kel-

ere

ing

ful

m-

the

rly

as-

nt. ct-

or

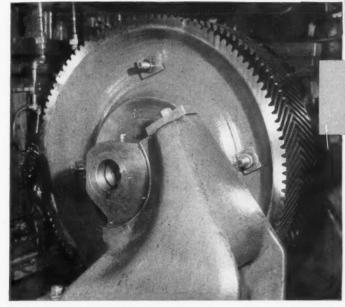
ın-

cel gh cel

le-

7

Good Blank





Good Gear

No gear is any better than the blank from which it's made. If you start with a blank that's sturdy from rim to hub, one that contains high-quality steel, many production problems are licked at the outset.

Bethlehem blanks have everything you need in the making of a good, tough gear. These heavy-duty products are of clean, sound steel of uniform density.

The blanks are not just rolled, not just forged, but *both*. Rolling and forging are combined in a single operation—one that shapes the hot blocks of steel and helps make the metal compact and homogeneous.

Blanks so processed are very strong; in fact, this advantage often makes possible the use of lighter sections. Another thing—the grain structure is excellent. That's a point your machinist will appreciate. Whether his cut is shallow or deep, he'll find the going easy. No hidden trouble down beneath.

Try some of these highly-dependable blanks when making spur, bevel, miter, and other types of gears. They are furnished untreated or heat-treated, in sizes ranging from 10 to 42 in. OD.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlebem products are sold by Bethlebem Pacific Coast Steel Corporation. Export Distributor: Bethlebem Steel Export Corporation



BETHLEHEM ROLLED-AND-FORGED CIRCULAR PRODUCTS

This steel bar

MACHINABILITY

puts parts in the pan...fast!



• Automatics hum a steady tune of production when they're running Union Cold Finished Steel Bars. Spindles whirl . . . tools bite into stock . . . and finished parts thump steadily into pans. That's MACHINABILITY-the Union Drawn kind.

Research has made Union Drawn Steel "MACHINABILITY Headquarters." Research that includes many years of actual production-line experience in steel users' plants . . . plus the unequalled facilities of famous Union Drawn machining laboratory.

That's why today's Union Cold Finished Steels consistently produce top ratings on feeds and speeds . . . freedom from abrasive elements . . . long tool life . . . smooth, bright machined surfaces...high production rates...low unit parts costs.

How about your production? Perhaps a session with one of Union Drawn's field technicians could help on set-up, tooling or other phases of machining steel . . . or, on cyaniding, carburizing, carbon correction and other forms of surface treatment. Just contact your Republic District Sales Office, your Union Drawn Distributor, or write:

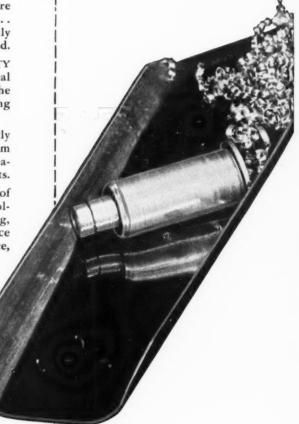
REPUBLIC STEEL CORPORATION

Union Drawn Steel Division . Massillon, Obio GENERAL OFFICES . CLEVELAND 1, OHIO Export Department: Chrysler Building, New York 17, N. Y.



UNION DRAWN

Union Drawn's newest fast-machining grade, B-1113X, could be your solution. Where your equipment and parts design are such that faster speeds and heavier feeds are practical, "X" steel may help boost production still higher. Ask your Union Drawn field man when he calls. Or, write for free booklet 554, "Republic Union Drawn "X" Steels." It's one of the six handy information-packed booklets in the Union Drawn "Pocket Library."







YOUR NEW GUIDE to Longer Machine Life

You may find in this booklet a part that you need to cure a continual maintenance headache. It describes a few of the thousands of machinery parts made of HAYNES alloys that have been used under difficult service conditions to assure long, satisfactory machine operation. Many of these parts have made possible large savings in down time and maintenance for countless manufacturers.

There are 19 different HAYNES alloys from which machinery parts can be made. Each alloy is specially designed to combat certain severe conditions of heat, corrosion, or wear.

All of the alloys can be obtained as castings: many as hot-rolled sheet and bars, stampings, forgings, and composite welded or brazed parts. They can be furnished ready for use—ground to the exact size and finish you want.

If you would like us to send you a copy of this booklet describing Haynes alloy machinery parts, just fill out the coupon below and mail it to us.

The terms, "Haynes" and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation.

HAYNES Trade-Mark Alloys

Haynes Stellite Company

A Division of Union Carbide and Carbon Corporation

UCC

USE THIS HANDY

Haynes Stellite Company, 735 S. Lindsay Street, Kokomo, Ind. Please send me, without obligation, a copy of the new booklet, "HAYNES Alloy Machinery Parts."

NAME

COMPANY

ADDRESS.

CITY AND STATE.





METAL CARBIDES CORPORATION

SINTERED CARBIDES . HOT PRESSED CARBIDES
CUTTING TOOLS . DRAWING DIES . WEAR RESISTANT PARTS

OVER
25 YEARS
EXPERIENCE
IN TUNGSTEN
CARBIDE
METALLURGY

He To cha

FO

no more GAMBLING on

tool steel selection"



[1/3 actual size; Selector is in 3 colors]

Here's how it works:

To use the Selector, all you need know is the characteristics that come with the job: type and condition of material to be worked, the number of pieces to be produced, the method of working, and the condition of the equipment to be used.

FOUR STEPS - and you've got the right answer! 1. Move arrow to major class covering appli-

cation 2. Select sub-group which best fits applica-

3. Note major tool characteristics (under arrow) and other characteristics in cut-outs for each grade in sub-group

4. Select tool steel indicated

That's all there is to it!

Here's an example:

Application — Deep drawing die for steel

Major Class-Metal Forming-Cold

Sub-Group — Special Purpose

Tool Characteristics -Wear Resistance

Tool Steel-Airdi 150

One turn of the dial does it!

And you're sure you're right!

That's what one of the thousands of pleased users says about his CRUCIBLE TOOL STEEL SELECTOR, the new, simple, handy method of picking the right steel, right from the start. Since Crucible announced this Selector two years ago, thousands of tool steel users have received their Selectors . . . and here's what some of them say -

"Handiest selector I've ever seen!"

"Saves me time and headaches"

"It's so logical-you begin with the application".

You can be sure the answer you get with your Crucible Tool Steel Selector will be just right in every case, for this Selector covers 22 tool steels which fit 98% of all tool steel applications. And when-with a flip of the round dial-you get the answer, you'll get the steel FAST, too, because all the tool steels on the Selector are right in stock, in all our 26 conveniently-located warehouses.

This Selector is bound to be a big help to youso write for yours today. There is no obligation whatsoever. Just fill in the coupon and mail now . . . before you turn this page and forget! CRUCIBLE STEEL COM-PANY OF AMERICA, Chrysler Building, New York 17, New York.

Crucible Steel Company of America

Dept. M. Chrysler Building, 105 Lexington Avenue

New York 17, N. Y.

Sure! I want my free CRUCIBLE TOOL STEEL SELECTOR!

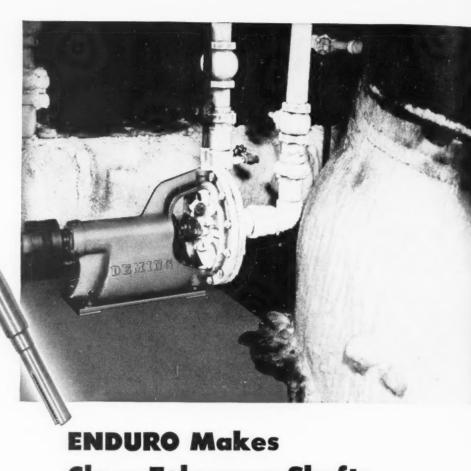
first name in special purpose steels

TOOL STEELS

52 years of

Fine steelmaking

Branch Offices and Warehouses: ATLANTA * BALTIMORE * BOSTON * BUFFALO * CHARLOTTE * CHICAGO * CINCINNATI * CLEVELAND * DENVER * DETROIT HOUSTON, TEXAS * INDIANAPOLIS * LOS ANGELES * MILWAUKEE * NEWARK * NEW HAVEN * NEW YORK * PHILADELPHIA * PITTSBURGH * PROVIDENCE ROCKFORD * SAN FRANCISCO * SEATTLE * SPRINGFIELD, MASS. * ST. LOUIS * SYRACUSE * TORONTO, ONT. * WASHINGTON, D. C.



Go

ma

lf you

Be with

be wa

fluid.

oil w

secon

shoul

You

about

listed

ALI

ENDURO Makes Close-Tolerance Shafts Corrosion-Resistant

Shafts for Deming Centrifugal Pumps must have high tensile strength. They must resist corrosion, as they often are in contact with brine, solvents, waste, and other corrosive solutions. They must resist abrasion and wear.

Since close tolerances are absolutely essential, the shaft, must be accurately machined—at reasonable unit cost.

A big order. Yet, Free-Machining ENDURO Stainless Steel meets all these shaft requirements.

Free-Machining ENDURO Bars are cold-finished by Republic's Union Drawn Steel Division to provide close tolerances, accuracy of section, uniform soundness and fine surface finish... plus the high physical and chemical properties of stainless steel. Two grades are 90% as machinable as Bessemer screw stock!

Free-Machining ENDURO also is available in hot rolled bars, and in wire. Republic metallurgists are ready to give prompt assistance on applications, processing, and use. Contact them through your Republic District Sales Office, or write:

REPUBLIC STEEL CORPORATION

Alloy Steel Division • Massillon, Ohio

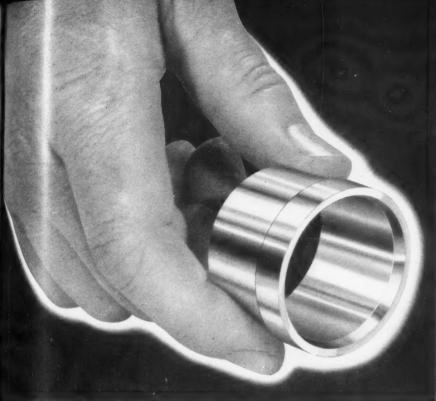
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

These stainless steel impeller shafts are manufactured from Free-Machining ENDURO, Type 416, by The Deming Company, Salem, Ohio. In the photo above, a Deming Centrifugal Pump is shown pumping brine in a packing house.



Other Republic Products include Carbon and Alloy Steels - Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

104—MACHINERY, August, 1952



Good coolant practice makes machining aluminum easy

If your tools dull quickly, your work runs hot or chips pile up in the tool zone, check your coolant.

Be sure you are using an adequate volume of coolant consistent with operating conditions. Keep the nozzles open. Direct the coolant stream to hit the work and tools, at the proper angle. Chips should be washed away to prevent fouling the tools. Use a good cutting fuid. Special aluminum coolants generally consist of light mineral oil with 5-10 per cent fatty additions. Viscosity should be 45 to 65 seconds at 100° F on a Saybolt Universal Viscosimeter. Flash point should be above 270° F.

Your local Alcoa sales engineer will gladly answer your questions about coolant practice, alloy selection and machining. You'll find him listed under "Aluminum" in your classified phone book.

> ALUMINUM COMPANY OF AMERICA 870-H Gulf Building • Pittsburgh 19, Pennsylvania



ALCOA OFFERS TWO BOOKS - Alcoa Aluminum in Automatic Screw Machines—a 95-page book containing information on tool design, setup and operating techniques.

Corrected Tool Diameter Tables—a 64-page book giving corrected tool diameters for circular form tools and flat form tools under conditions of 0° , 5° and 10° top rake.

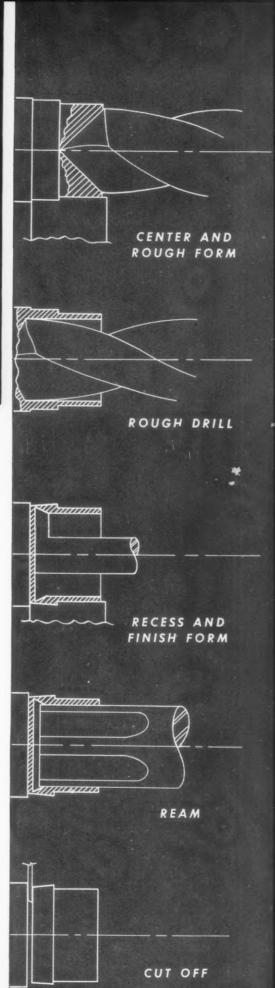
ALCOA

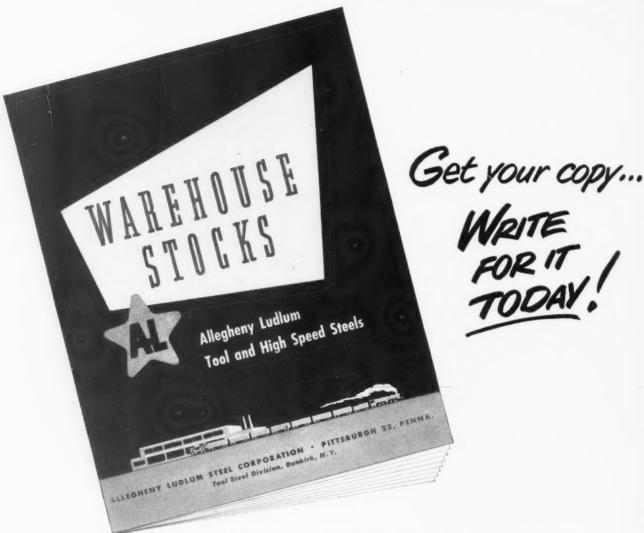


ALUMINUM SCREW MACHINE STOCK



ALCOA TELEVISION-CBS Network, 6:30 to 7:00 P. M. EDST every Sunday on most stations—8:30 to 9.00 P. M. in far West





Here's a TOOL STEEL STOCK LIST that's really Clear, Concise and Dependable!

There's an A-L Tool Steel to do each job *best*

The Allegheny Ludlum Tool Steel family includes 37 principal types, covering the high speed, hot work, shock resisting, cold die, and carbon and low alloy steel fields. Let us help you find the best answer to any problem that occurs in your production or use of cutting and forming tools.

ADDRESS DEPT. M-32

This 72-page catalog lists the stocks of A-L High Speed and Tool Steels which are constantly maintained in each of 18 warehouses, located at convenient points from coast to coast. In compact, easy-to-follow style, the book gives a complete stock picture, nationwide, of the 15 most widely used types of these steels—each in a full range of standard shapes and sizes—and also includes data on stocks of drill rod, tool bits and Carmet carbide metal blanks and tools.

It may be that your requirements call for mill shipments. If so, you can rely on us to schedule material for you without delay. But—if you depend entirely or in part upon ordering High Speed and Tool Steels in smaller lots—and want to know where you can get them quickly—you'll find A-L's book of "Warehouse Stocks" mighty handy to have in your desk. • Write for your copy today! Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

For complete MODERN Tooling, call Allegheny Ludlum







BULLARD

MANUFACTURERS OF MACHINE TOOLS



Boeing B-47 Stratojet medium bomber

Boeing Airplane Co. Photo

The Invisible Background of Industrial Progress

Today's planes contact inaccessible corners of the world taking foods, lifesaving medicines and important materials quickly to famine ravaged areas, the frozen north and flood stricken districts.

Distance in terms of time is only a matter of hours and fractions thereof.

In one day of flying, surveyors and engineers accomplish work that once took months.

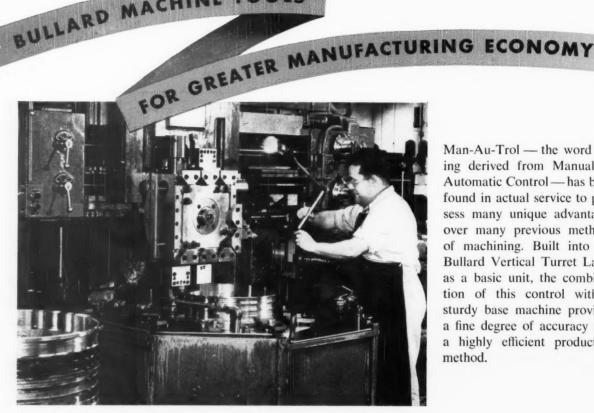
Planes such as the Boeing illustrated here, increase our strength for defense and give us greater assurance of Freedom and continuance of the American Way of Life. . . . Faster flying demands stronger construction, tougher and heavier materials. The wing of one American fighter plane can support approximately 150 tons of dead weight. The skin panels of B-47 Stratojet wings are machined for maximum strength, and jet engines running at temperatures up to 1800° F require new heat resistant alloys. . . . In the Invisible Background of Industrial Progress — *Modern Machine Tools take their place in the manufacture and maintenance of America's

huge commercial and military air arm.

In this Invisible Background
The Bullard Company is playing
an increasingly important part.

THE
BULLARD COMPANY
BRIDGEPORT 2
CONNECTICUT

★ For greater manufacturing economy REFER to next page BULLARD MACHINE TOOLS

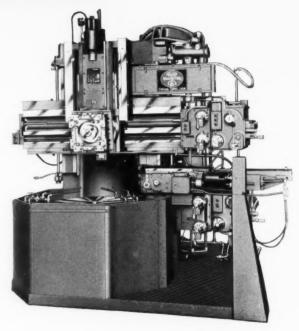


Man-Au-Trol — the word being derived from Manual or Automatic Control - has been found in actual service to possess many unique advantages over many previous methods of machining. Built into the Bullard Vertical Turret Lathe as a basic unit, the combination of this control with a sturdy base machine provides a fine degree of accuracy and a highly efficient production method.

Shortly after the introduction of the Man-Au-Trol Vertical Turret Lathe to the industries it was found that the machine and its tooling provided an economical and highly productive single spindle unit for the larger and heavier types of jobs requiring fine finish and a high degree of repetitive accuracy.

Man-Au-Trol Vertical Turret Lathes working today on high production for the defense program will readily and profitably adapt themselves to the easier pace of normal manufacturing procedures.

Versatility is only one of the many advantages of these machines and it will pay you now and in the future to investigate their possibilities in your plant.

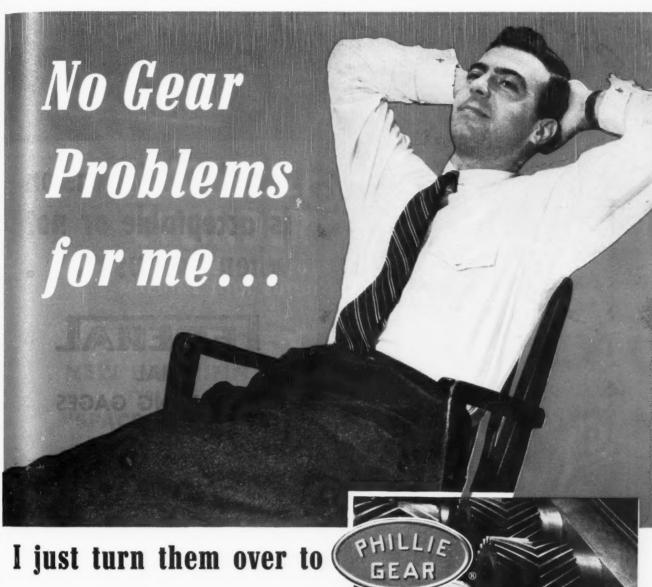


Bullard Man-Au-Trol Vertical Turret Lathe — another step toward Greater Manufacturing Economy. Built in 30-, 36-, 42-, 54-, 64-, and 74-inch sizes.



THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT



Yes, you can "rest assured" when you order from Philadelphia. For 60 years, we have been supplying every line of industry with gears of all types, sizes and materials. In that time we have encountered and found solutions to almost every kind of gear problem. This specialized experience plus our modern gear making methods and machines can be the answer you have been looking for.

Whether you need one gear or a hundred you'll get satisfaction and service by ordering from Philadelphia. A copy of our gear catalog #48 is a helpful guide for gear buyers. Write for it on your business letterhead.



Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK - PITTSBURGH - CHICAGO - HOUSTON - LYNCHBURG, VA.

Industrial Gears and Speed Reducers LimiTorque Valve Controls

Mou Know Forterand Positively



whether a dimension is acceptable or not when you use . . .

DIAL INDICATING GAGES

... and you know *how much* wrong a non-acceptable dimension is, which is also valuable information.

There are thousands of jobs that could gain valuable help from the correct use of the right gage. Federal can help because of its concentrated experience in applying every type of Dial Indicator and Gage to every imaginable need.

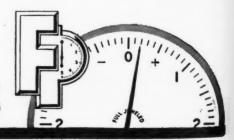
Because Federal designs and makes all types we can be impartial and furnish a Gage from a wide selection of stock type Indicators and Gages. Or, we can apply our wide experience in designing Special Gages with the chances strongly in favor of their not having in them the "bugs" which often occur in gages made by the user.

The experience of designing over 25,000 Gages of every conceivable type and know-how in making them so they will tell the truth should be worth something to you.

Send for catalog or tell us your requirements and we will recommend a Gage to tell you quickly and positively what you want to know. FEDERAL PRODUCTS CORPORATION, 1118 Eddy St., Providence 1, Rhode Island.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing <u>all types</u> of DIMENSIONAL INDICATING GAGES







PRECISION BUILT

"Space Saver"

HYDRAULIC

CYLINDERS

SPECIALLY DESIGNED FOR MACHINE TOOL BUILDERS

When you mount a hydraulic cylinder in a machine tool, it ought to be good. It should be precision engineered . . . quality constructed for long, trouble-free service.

Now, Hannifin offers that kind of hydraulic cylinder in its two compact "Space Saver" lines. Designed by Hannifin Engineers, these cylinders make no compromise with good design—are built to the exacting standards that have made Hannifin Series N cylinders the standard of the industry.

Whether you need these rugged, all-steel hydraulic cylinders for production tools or for machines you build for resale, investigate these new Hannifin designs today!



"SPACE SAVERS"

9 Bore Sizes, 11/2" to 6"-Pressures to 2000 P.S.I.

WHY HANNIFIN "SPACE SAVERS" ARE BEST FOR YOUR MACHINES

Ruggedly constructed in FULL COMPLIANCE with J.I.C. Hydraulic Standards. MULTIPLE seal gland packing removable without disassembling cylinder—UNOBSTRUCTED ports—PRECISION piloting of cylinder body and end caps—pre-stressed tie rods—positive end seals—end caps machined from solid steel—hardened rods available. As in all other Hannifin designs, cylinder walls are "Tru-Bored" and honed; rods are turned, ground and polished; mounting clevises, angles and flanges are sturdy, well designed.



WRITE FOR

Contains complete construction details and specifications for all models.

NEW UNIVERSAL MODEL U

IDEAL FOR TOOLING, JIG OR FIXTURE WORK

Compact! The 1" bore cylinder is only 1½" square. Basic cylinder mounts on side or either end—also furnished with mounting flanges or head end clevises. Gland packing and piston seals feature Hannifin's new, thoroughly tested "Lipseal" packing, which makes it possible for these compact little cylinders to operate on either hydraulic oil or lubricated air. Combines low friction with minimum leakage. Hardened rods standard.

WRITE FOR BULLETIN 112

Complete description and specifications

1", 11/4", 11/2" Bores—Pressures to 1000 P.S.I.

OF AN IN COLUMN

do ALL you CAN do ... with

HANNIFIN

Hannifin Corporation, 1109 S. Kilbourn Ave., Chicage 24, III.

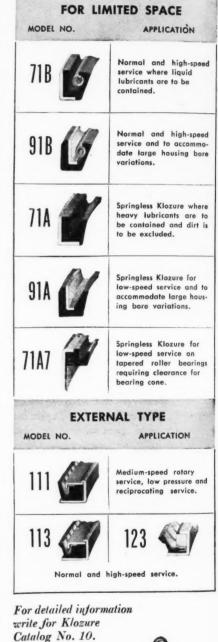
Air and Hydraulic Cylinders . Hydraulic Power Units . Pneumatic and Hydraulic Presses . Air Control Valves

PROTECT YOUR BEARINGS with KLOZURE* OIL SEALS!

There's a model designed for every bearing application

MODEL NO.	APPLICATION
63	Normal and high-speed service.
53	Normal and high-speed service.
51	Medium-speed rotary service, low pressure and reciprocating service.
64	Large shafts operating under severe service.
65	Heavy-duty service at moderate speeds.
SPEC	CIAL PURPOSE
MODEL NO.	APPLICATION
54	Sealing spherical surface on self-aligning or spherical bearings.
142	Sealing plane surface perpendicular to axis of the shaft.
SPLIT KLOZURE	For installation without disassembly of equipment.
11	Medium-speed service against heavy lubricants

ODEL NO.	APPLICATION
R-1	Medium-speed double- duty service.
-2	Medium-speed double- duty service where liquids are present on both sides of seal.
F	Medium-speed service. Two sealing elements in tandem.
B 1	Medium-speed service where abrasive conditions are severe.
-2	Medium-speed service where minimum leakage is of great importance.
-1	Medium-speed service where dirt conditions are severe.
MET	TRIC SIZES
DEL NO.	APPLICATION
63 - 53	For press fit into stand- ard International milli-
51 - 65	meter ball and roller bearing housings.
MPERATUR	RES ABOVE 300° F.
CIAL MODELS	APPLICATION



THE GARLOCK PACKING COMPANY, PALMYRA, N. Y. In Canada: The Garlock Packing Co. of Canada Ltd., Toronto, Ont.

Klozure Model numbers.

N. Y.

or generated heat on

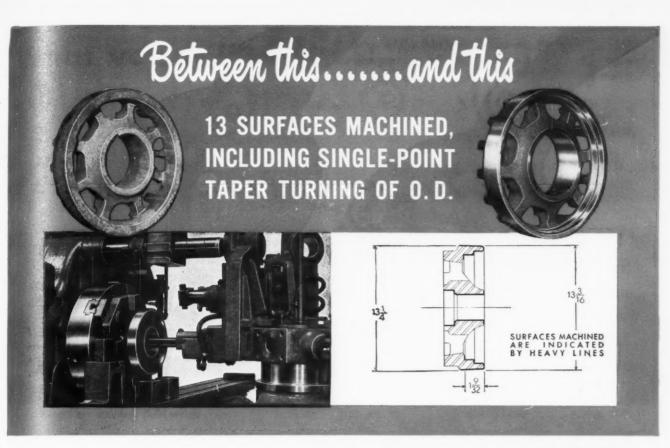
very high-speed shafts.

GARLOCK

and mild dust conditions.

PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS,
RUBBER EXPANSION JOINTS

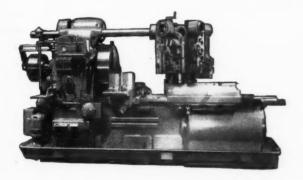
*Registered Trademark



THE POTTER & JOHNSTON 6-DREL

Automatic Turret Lathe

DID THE JOB RAPIDLY, ACCURATELY, PROFITABLY



It takes full power, real productive capacity and efficient tooling to machine precision parts like this steel coil support with speed and economy. That's why a Potter & Johnston 6-DREL Automatic Turret Lathe was selected. In the ingenious tooling set-up engineered by P & J Specialists, the overhead pilot bar is equipped with a cam which operates a turret slide tool to machine the O.D. taper with a single-point cut.

For increased output with high accuracy and lowest unit cost, today's top production team is P & J Automatics and P & J Tooling. If you're looking for more and better work with fewer rejects, you'll want to get the facts on Potter & Johnston Automatics. Write on your company letterhead for your copy of Bulletin No. 148. And be sure to send your tough production problems to the P & J Engineering Department. We will be glad to recommend the best possible combination of tooling and operation sequence. There is, of course, no obligation.

Precision Production Tooling for over 50 years

POTTER & JOHNSTON

PAWTUCKET, RHODE ISLAND



SUBSIDIARY OF PRATT & WHITNEY



DIVISION NILES - BEMENT - POND CO.

WRITE DIRECT OR CONTACT THE PRATT & WRITNEY BRANCH OFFICE NEAREST YOU BIRMINGHAM . BOSTON . CHICAGO . CINCINNATI . CLEVELAND . DETROIT . LOS ANGELES . NEW YORK . PHILADELPHIA . PITTSBURGH . ROCHESTER . SAN FRANCISCO . ST. LOUIS . EXPORT DEPT., WEST HARTFORD A GENTS . DALLAS, THE STANCO CQ. . HOUSTON, WESSENDORFF, NELMS & CQ.



These 2 Multi-Job NORTON

PRINTOPERA

hub wheels

grind faster...
easier...and
can't fly apart!

Lighter and easier to handle than cup wheels! Longer lasting than coated abrasive discs. More versatile than either! That's the handlest pair in portable grinding...the time-tested Norton BD rigid hub wheel and the sensational new Norton BFR semi-flexible hub wheel.

What a difference they'll make in your shop. For grinding jobs where finish is more important than stock removal—and especially for blending corners and contours—the new BFR semi-flexible hub wheel is your best bet. For more severe work where stock removal is important, your vote goes to the BD wheel. Check the chart at the right.

Both cut fast . . . thanks to their sharp, durable aluminum oxide abrasive and special resinoid bond.

Both are nylon-web-reinforced, for extra safety. They hold together even if accidentally cracked until the machine can be stopped and the wheel changed.

Ask your nearby Norton Distributor to demonstrate these versatile Norton Reinforced Hub Wheels to you. He's listed under "Grinding Wheels" in your classified telephone directory. Or write for new Bulletin 225. NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. EXPORT: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

What versatility!

Just a few of the jobs you can do with the handiest, safest pair for portable grinding. Where both types of wheels are indicated choice is dependent on the nature of the job.

THE JOB	BD RIGID	BFR* SEMI-FLEXIBLE
Removing rust and scale, scarfing and beveling before welding	A24-O14BD	A24-K BFR
Cutting away, smoothing and blending welds on fabricated work	A36-O14BD	A24-K BFR
Making V cut to remove old weld materials for salvaging steel parts	A24-R14BD	
Removing burrs and sharp edges from steel sheets and plates	A36-R14BD	A24-K BFR
Roughing off excess weld material before smoothing with coated abrasive discs	A24-O14BD	A24-K BFR
Cutting off gates and risers on brass, bronze and aluminum castings		A24-K BFR
Notching large gates and risers on all kinds of castings	A24-R14BD	A24-K BFR
Cleaning between teeth of large marine and industrial gears	A36-O14BD	
Removing mold marks and smoothing castings before painting		A24-K BFR
Smoothing flame-cut edges on heavy steel sheets and plates	A24-R14BD	
Smoothing stainless steel welds	A24-O14BD	A24-K BFR
Smoothing and blending copper, bronze, aluminum and stainless steel surfaces	A24-O14BD	A24-K BFR

*A24-K BFR is considered a good all around specification but for jobs where finish is not important 16 grit will give somewhat longer wheel life.



Cutting down a heavy weld is quick and easy for you with a Norton BD rigid wheel.



Blending in a welded corner is a job you can do faster and better with a Norton BFR semi-flexible wheel.



Smoothing out a welded radius also calls for a work-hugging BFR semi-flexible wheel.



Smoothing a flame-cut edge comes naturally to an extra-strong, extra-safe BD rigid wheel.



Cleaning out fins of a compressor casting is a tough job made easy by a BD rigid wheel.



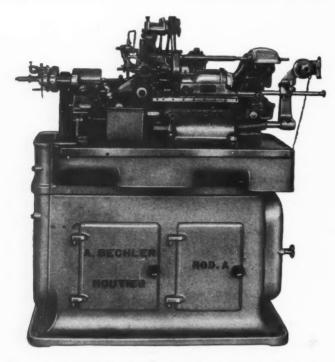
Notching risers on gray from castings is an easy job for either the BD or BFR wheel. Take your choice.

Making better products to make other products better



MEET HIGH PRECISION DEMANDS with

BECHLER SWISS AUTOMATICS



Model A-10 BECHLER AUTOMATIC has 36" diameter capacity, $2\,^34$ " turning length, 5 cross tools. This Automatic is equipped with single spindle threading attachment and slotting attachment for producing PRECISION SCREWS.

The advantages of using BECHLER AUTOMATICS to speed production:

- 1. Over 20 spindle speeds.
- 2. 88 camshaft speeds for each spindle speed selected.
- 3. More than 30 different attachments.
- 4. A new device prevents the breaking of carbide tools.
- 5. Easiest tool adjustments.

DIAMETER CAPACITIES

BECHLER AUTOMATICS

Mo	del AS	5/64"	5/32"	9/32"	3/8"
Mo	del A	_	5/32"	9/32"	3/8"
Mo	del B	1/2"	5/8"	3/4"	_
Mo	del C	1"	11/4"	_	_

BECHLER ISOMATICS

Automatics for constant and highly accurate production of very small parts.

Model	AS	5/64"	5/32"	9/32"
Model	A		5/32"	9/32"

OTHER BECHLER MACHINES ... MODEL CF CAM SHAPERS . SIMPLEX AND DUPLEX PINION CUTTING MACHINES

ADDITIONAL SERVICES

- ATTACHMENTS, SPARE PARTS, CAMS available from New York Stock
- TOOLING SERVICES for planning layouts and setups and for making cams and tools

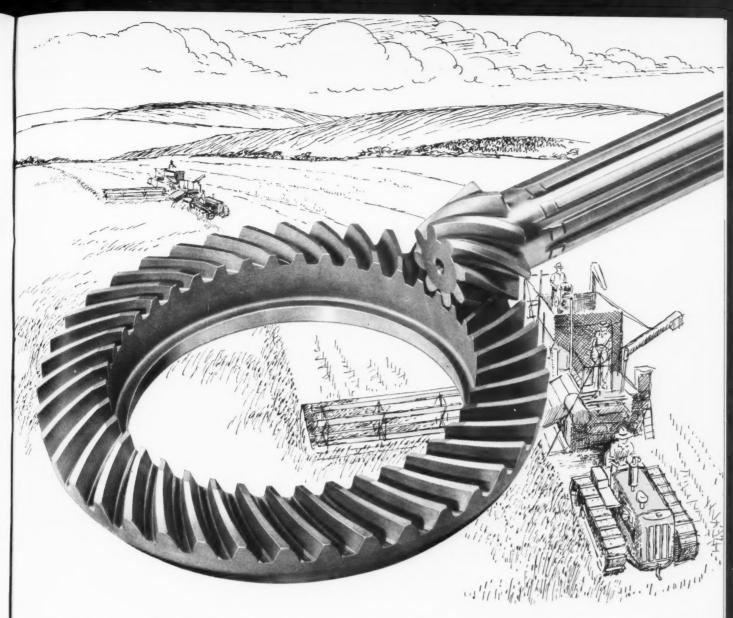


COSA CORPORATION
405 Lexington Ave., New York 17

Your source for all Precision Machine Tools from Small Bench Lathes to Large Boring Mills

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

116-MACHINERY, August, 1952



RURAL AMERICA rides on "Double Diamonds"

GEARS for farm machinery are not necessarily a specialty with us. Our production includes gears for many other applications. But it is a fact that thousands of farm machines move into their all-im-

portant jobs with power transmitted by "Double Diamonds."

When you consider the beating that farm machinery takes, the industry's preference for "Double Diamond" Gears speaks highly of

their stamina and all-round performance. It may suggest, as well, the advisability of calling in a "Double Diamond" engineer the next time you need gears of the many types we manufacture.



AUTOMOTIVE GEAR WORKS

AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS









FLYWHEEL GEAR



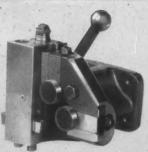








SPLINE SHAFT



THE SINGLE CUTTER TURNER mounts the cutter tangentially behind the work. Thus the chips never clog the tool but fall free into the pan, and the operator is shielded from splashing coolant. The rigidity and the quick, accurate micrometer adjustment makes this tool highly efficient for rapid production.



THE CENTER DRILLING TOOL is extremely sensitive and fast in operation. Interchangeable collets adopt the several sizes of center drills.



THE OVERHEAD PILOTED SLIDE TOOL combines versatility with new rigidity and accuracy, and is a real time saver on boring, facing and recessing operations.



THE ADJUSTABLE TURNING HEAD carries cutter holders and boring bars. The large diameter graduated micrometer dial facilitates the quick and accurate setting of the cutter.



THE QUICK-ACTING SLIDE TOOL is outstanding for operations such as back facing, internal necking and recessing.



THE BALL BEARING CENTER rigidly supports the work at high speed for taking cuts from the cross slide.



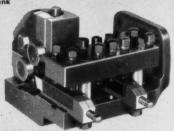
THE RELEASING TAP HOLDER provides positive drive, sensitive release and sufficient float for the alignment of the tap. A spring collet, with square shank for driving, holds the tap.



THE ADJUSTABLE CUTTER HOLDER permits quick micrometer adjustment for turning to close tolerances.



THE PILOTED MULTIPLE TURNING HEAD features a pilot bar mounted on the headstock, leaving the hexagon turret unencumbered of its added weight and bulk. A large series of cutter holders and boring bars can be adapted for multiple turning, boring and facing.



THE MULTIPLE CUTTER TURNER has the roller back rest interlocked with the tool cap for increased rigidity. An additional roller back rest can be supplied as an extra.

Efficient Tools on your Turret Lathe

MEAN HIGHER PRODUCTION AND LOWER COST...



THE TOOLS SHOWN constitute only a few of the hundreds of different kinds and sizes of turret lathe tools that we build. Bardons & Oliver tools are outstanding in design and efficiency of metal removal, in ease of accurate size adjustments, and high quality of finish produced.

While these tools are designed primarily for use on the Bardons & Oliver ram and saddle type turret lathes, many of them can be applied to render other makes of turret lathes capable of increased production.

The latest cemented carbide cutters can be used to their full productive capacity in Bardons & Oliver tools.

These two tool catalogs will help you to select the proper tools for your turret lathes. Your copies will be mailed promptly, upon request.

We build a complete line of ram and saddle type turret lathes, also automatic and hand operated cut-off machines.

BARDONS & OLIVER, Inc.

.

1135 WEST 9TH STREET

CLEVELAND 13, OHIO



Big planers are usually slow planers. But not a GRAY! Bucyrus-Erie found that out when they put a new GRAY 132" x 120" x 50' Heavy Duty Planer to work. This precision GRAY with modern high speeds and operating conveniences is machining a 55' long side section of revolving frame of a Bucyrus-Erie dragline a big mouthful in any shop. Again, performance is proving that planer jobs don't grow old on a GRAY.

Write today get the story on HIGH low cost PRODUCTION

The G.A. GRAY Company

GIANTS
that move
MOUNTAINS

planers · milling planers

planer type milling machines

horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.

SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. . SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

From the world's leader in machine tools come the new CINCINNATI Grinding Wheels

A practical approach to improvement in grinding wheels demanded frank recognition of the grinding wheel as a cutting tool. Cincinnati Milling research has proved that the grinding process is a true metal cutting process. The grinding grits do not abrade or wear

away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

The essential factors involved in this vitally important matter of good chip formation are:

1. The tool must be well supported

and properly presented to the work.

the

- 2. The chip must slide freely up the face of the tool.
- 3. Heat generated must be kept to a minimum.
- 4. The heat that is generated must be removed rapidly.

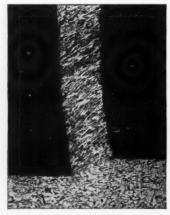
This is the beginning of a whole

BASIC CHIP TYPES:

Photomicrographs of cross sections taken through partially formed chips obtained under various conditions in machining operations such asturning, milling, planing and broaching.



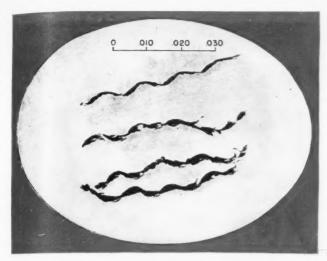
Type 1—discontinuous or segmental chip.



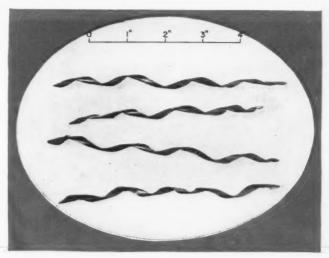
Type 2—continuous chip without built-up edge.



Type 3—continuous chip with built-up edge.



Type 2 chips obtained from grinding operation on SAE 1112 steel, selected to indicate the free chip formation possible.



Type 2 chips obtained from helical milling operation on SAE 1112 steel. Note similarity in shape to the grinding chips.

new approach to grinding wheels—the development of the grinding wheel as a true cutting tool. And, as you might expect, this basic new concept comes from the world's largest builder of machine tools.

For you, this means grinding

rk. the

o a

ust

ole

wheels developed and tested over a period of several years on the basis of true function—as cutting tools forming recognizable chips.

Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, just write, wire or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Co.



Type 1 chips obtained from grinding operation on cast iron. Typically discontinuous or segmental.



Type 3 chips obtained from slow speed grinding operation on SAE 1112 steel—continuous with built-up edge.



TYPICAL COMMENTS HEARD AT ASTE SHOW ABOUT WALES DRILLING MACHINES

"This Machine would handle 90% of my jig boring requirements,"

"I didn't know what a precision machine this was until I just watched it operate."

Simplicity and Precision man



• It's not what we say but what users and prospects comment about WALES DRILLING MACHINES that really tell the story.

Wales Drilling Machines are specially designed, precision engineered and accurately constructed to meet

"Designed for just my requirements."

Pt

cis

m

in

ca ni

fir

þr

pi

cision engineered and accurately constructed to meet the close tolerance requirements of locating, drilling and reaming holes in material of practically any length and up to 36" wide. There is no other drilling machine or jig borer like it.

Built-in "Scan-A-Scales" calibrated in ten thousandths of an inch accurately locate drill head and slide rail taking over after rough positioning by rapid traverse.

For the complete story on Wales Drilling Machine, write TODAY for fully-illustrated, functionally-colored Catalog DM.



Showing the 2 built-in "Scan-A-Scales" that accurately locate drill head and slide rail for "zeroing in". Air locking clamps hold the work rigid during drilling operations.

Showing a hole in the work being reamed by simply interchanging the drill and bushing with corresponding size reamer and reamer bushing.

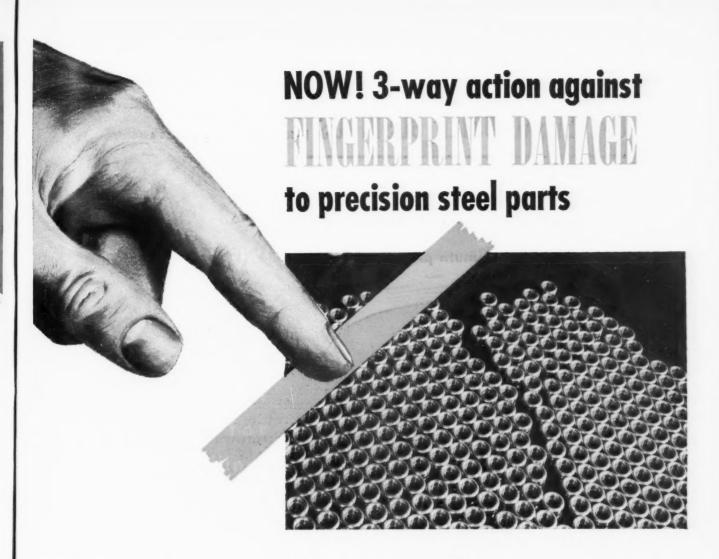
WALES-STRIPPIT CORPORATION

GEORGE F. WALES, Chairman

375 PAYNE AVE., NORTH TONAWANDA, N. Y.
(Between Buffale and Niagara Falls)

WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO

Specialists in Punching and Notching Equipment



GULF NO-RUST F.P.R.

- displaces fingerprint moisture
- neutralizes perspiration acid
- lays down temporary rust preventive film

Precision metal parts can lose some of their precision as a result of an ordinary fingerprint. The moisture and acid corrode the polished surface, interfere with smooth operation.

Gulf's new fingerprint remover eliminates this cause of lost accuracy in precision-built mechanisms. Called Gulf No-Rust F.P.R., it displaces fingerprint moisture on metal, neutralizes perspiration acid, and lays down a temporary rust preventive film.

Gulf No-Rust F.P.R. may be applied by dipping, flooding, or spraying to steel, brass, copper, and other metal surfaces. It is readily removed with Gulf Stoddard Solvent or similar petroleum solvents.

Gulf No-Rust F.P.R. is one of a complete line of Gulf quality rust preventives from which you can select the proper protective coatings to meet all your requirements. A Gulf Sales Engineer will be glad to cooperate with you in the solution of your rust and corrosion problems. Write, wire, or phone your nearest Gulf office today.

Gulf Oil Corporation · Gulf Refining Company Pittsburgh 30, Pennsylvania



FIVE FACTS ABOUT

UNIVERSAL DRILL BUSHINGS 1-SUPER FINISH REDUCES WEAR

One of the quality products that has helped to build Universal's Frankenmuth plant





2-BLENDED RADIUS REDUCES TOOL HANG



3-100% CONCENTRICITY AND HARDNESS TESTS ASSURE ACCURACY



4-KNURLED HEAD PROVIDES QUICK SURE GRIP



5-COMPLETE VARIETY OF SIZES AND LENGTHS



UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 2, MICHIGAN

Demand Has Necessitated Publishing New and Revised Second Edition

Mrite

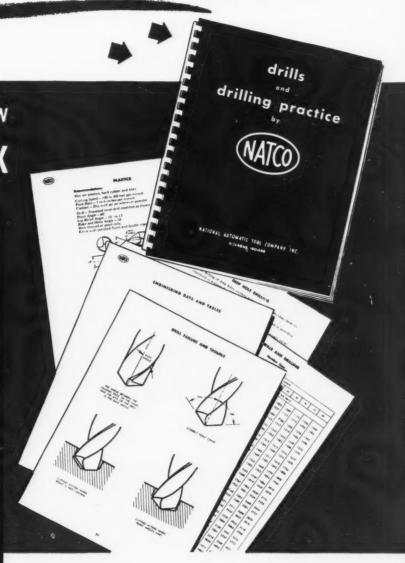
RACY

FOR THIS AUTHORITATIVE NEW

62-PAGE HANDBOOK

Completely indexed for quick reference. Packed with useful information for economical drilling.

This book is the result of over fifty years of practical experience in drilling which has been accumulated from the entire NATCO engineering and operating staff.



Get your copy of

"DRILLS and DRILLING PRACTICE" today!

Send only one dollar with this coupon



NATIONAL AUTOMATIC TOOL COMPANY, INC.
Richmond, Indiana

BRANCH OFFICES: 1809 Engineering Bldg., Chicage • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffals • 2907 Commerce Bldg., New York City Engineering Department
NATIONAL AUTOMATIC TOOL COMPANY
Richmond, Indiana

Gentlemen: Please send me _____ copies of Drills and Drilling Practice for which I enclose _____ to cover the handling cost at one dollar a copy.

NAME____

COMPANY

STREET ____



we have a LONG one!

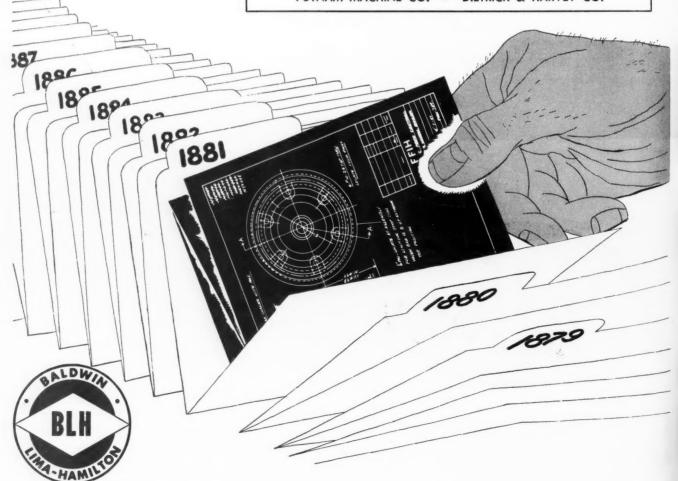
He wrote, "Can you service a Niles 20-foot Boring Mill built in 1881?"
"Of course," we wrote back. With the result that this 70-year old machine tool is now hard at work turning out tank parts in Minnesota,

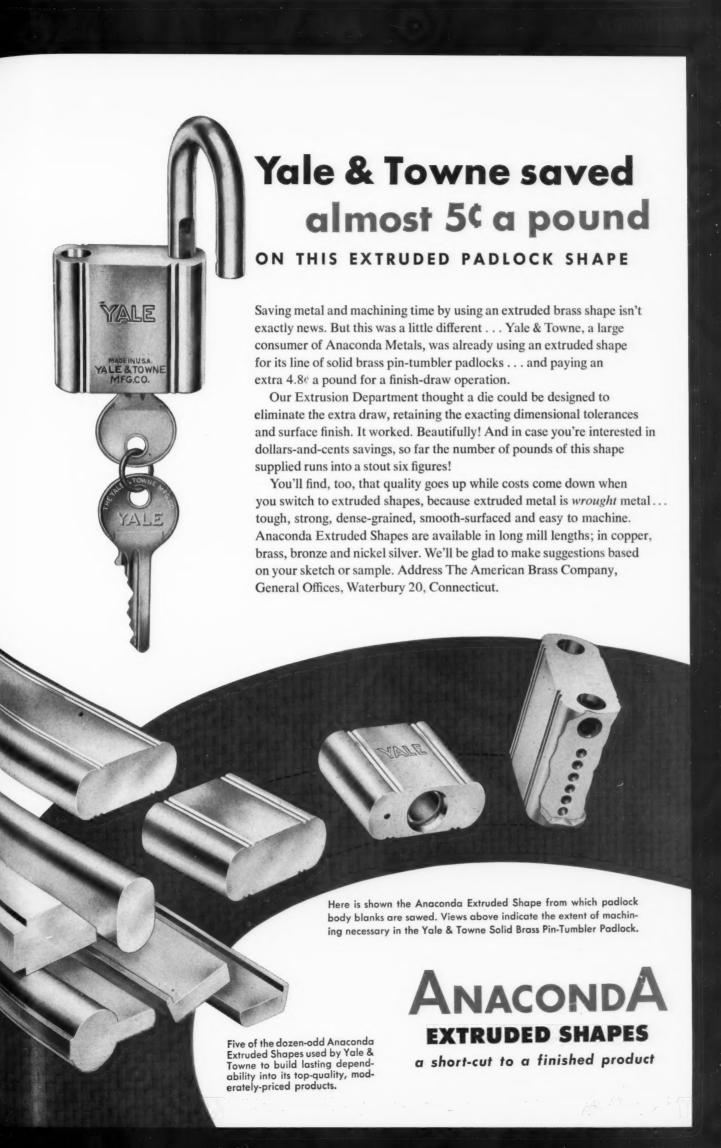
Which proves a point. The machines built by Niles Tool Works (and the other companies listed) were built heavier than most machine tools to give longer useful life. Thus many are still in service. But parts do wear out. So when this happens, remember:—we still have complete records and drawings—we still service all machines manufactured under these various corporate names.

Long-time wear like this and the long-time service we offer—are plus reasons for buying Niles Tools. Write: Lima-Hamilton Division, Baldwin-Lima-Hamilton Corporation, Hamilton, Ohio.

NILES TOOL WORKS CO.

BEMENT MILES & CO. • RIDGEWAY MACHINE CO. POND MACHINE TOOL CO. • L. W. POND CO. PUTNAM MACHINE CO. • DIETRICK & HARVEY CO.







It takes a lot of telling to sum up

Nicholson quality---

ıe

adily

te

ted.

in

d

Eighty-eight years of experience in making files--exclusively

• File steels are Nicholsonspecified and analyzed for sustained quality • Blanks are forged to exacting standards • Surface ground and drawfiled to remove all scale and assure clean, sound, evenly-high teeth • Scientifically annealed and perfectly straight-

• Uniformly hardened by scientifically controlled methods for very best performance • Manufacturing operations checked at every stage of production • Additionally sharpened by sandblasting • Oiled for rust prevention • Individually cups for basic soundness • Final-

ened for accurate cutting of

teeth with Nicholson-built machines

"rung" for basic soundness • Finaltested for hardness and sharpness

 Sold with Nicholson's assurance of Twelve perfect files in every dozen.

> ... that's why there's never a question about Nicholson or Black Diamond files being worth every penny you pay for them.

Buy through your Industrial Distributor

The high and wide reputation of these outstanding files is in itself good evidence of their quality. But there are plenty of technical facts in support of it (as exemplified above).

FREE 48-PAGE BOOK, "FILE FILOSOPHY," to aid your production and purchasing personnel toward a full understanding of the kinds, use and care of files. How many copies, please?

NICHOLSON FILES



IY

NICHOLSON FILE COMPANY 18 ACORN STREET, PROVIDENCE 1, R. I. (In Canada, Port Hope, Ont.)



A FILE FOR EVERY PURPOSE

A GA A

Outstanding Clutch Performance



NIAGARA MACHINE & TOOL WORKS . BUFFALO 11, N. Y.

Ma

Electrically Controlled Air Actuated SLEEVE CLUTCH

PROVIDES ECONOMY AND EFFICIENCY OF OPERATION for presses with high frequency clutch engagement

ASSURES POSITIVE DRIVE, no slippage.

HAS NO FRICTION SURFACES to heat up or wear.

15 SMALL IN DIAMETER and therefore has low inertia, thus minimizing power lost in starting and stopping.

RUNS IN A BATH OF OIL to reduce wear.

HAS LOW AIR CONSUMPTION which reduces operating costs.

LOCATED AT END OF SHAFT so that it can be quickly and easily disassembled for inspection and servicing without removing clutch gear.

HAS FEW MOVING PARTS...integral jaws and splines resulting in reduced maintenance costs.

HAS SINGLE SOLENOID VALVE to control air flow to both clutch and brake, preventing overlap of clutch and brake action, a distinct possibility when separate solenoid valves are used.

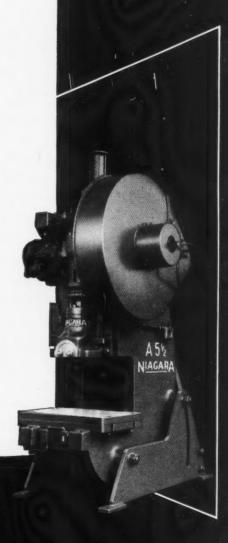
PROVIDES EFFORTLESS OPERATION with palm button or foot switch.

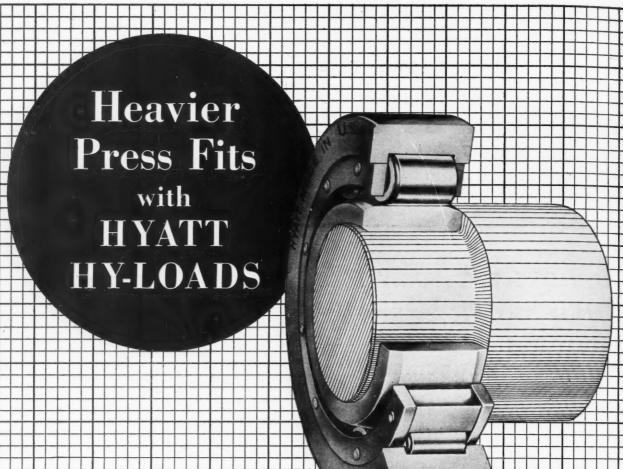
PROVIDES INSTANT ENGAGEMENT OR DISENGAGEMENT at any point in the stroke.

CAN BE SINGLE STROKED, JOGGED or operated continuously.

CAN BE STOPPED INSTANTLY by stop button, electric eye, limit switch or similar device.

STOPS AUTOMATICALLY if electric current or air pressure fails, an important safety feature.





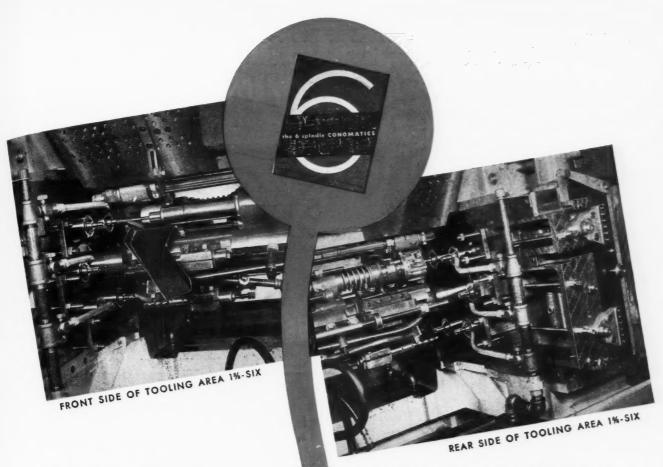
THE simplest way to mount bearing inner races is by press fitting. Hyatt Hy-Load Roller Bearings are designed and constructed to permit relatively heavy press or shrink fits of races—fits sufficient to retain races properly without resorting to auxiliary devices such as snap rings, lock nuts or keys.

This is possible because Hyatt Hy-Load races are made from carburizing type steels, carburized and heat treated to provide hard, wear resistant, case-hardened surfaces with tough ductile cores. A hard surfaced race with a ductile core permits heavier press fits than a through hardened race.

The hazards of slippage, cocking or eccentricity, always present with loose fitting races clamped endwise, are avoided when races are properly press fitted.

For more information about this and many other features of Hyatt Hy-Load Roller Bearings, write for Catalog 547. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

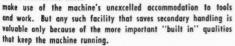
HYATT ROLLER BEARINGS



THE IMPORTANT

All brands of multiple spindle bar automatics offer value or they would not be on the market. If it were possible to engineer and incorporate the superior qualities of all into one machine, certain features would still be considered more important than others in accordance with the individual buyer's requirements.

Cross drilling without costly spindle stopping of many CONO-MATIC innovations which



But there is one essential quality required of all brands-regardless of the job. It is dependable, low cost performance! CONOMATIC users know well its benefits. But you don't have to be a user to know about this feature, or any other feature, of the CONOMATIC. Just write, wire, or phone for the information. There is no obligation.



A Comparison of ALL Automatics is in favor of Cone



Conomatic CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

MACHINERY, August, 1952-133





MADE IN SIZES FROM 100" UP TO ANY REQUIREMENT

> BETTS 20' HEAVY DUTY VERTICAL BORING AND TURNING MILL

Among Heavy Machine
Tools built by
Consolidated are

LATHES BORING MILLS DRILL PRESSES MILLING MACHINES BORING MACHINES COLD SAW MACHINES BORING, DRILLING AND MILLING MACHINES DRILL AND TOOL GRINDERS PLANERS SLOTTERS RAILROAD SHOP TOOLS AUTOMOTIVE TOOLS AND OTHER SPECIAL MACHINES

Betts Heavy Duty Boring and Turning Mills are general purpose tools of simple, rugged design particulary adapted to heavy continuous operations requiring a high degree of accuracy combined with power. Among the outstanding features that have made Betts Mills leaders in their field, is their type of table mounting that insures positive concentricity. They are built in a size range from 100" swing up to any size to meet your requirements.

Full information covering any size Betts Boring and Turning Mill in which you are interested will be furnished upon request.

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS . BETTS-BRIDGEFORD . COLBURN . HILLES & JONES . MODERN . NEWTON . SELLERS



CONSOLIDATED MACHINE TOOL CORPORATION

SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

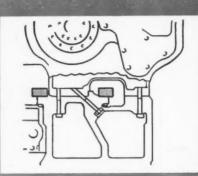
ROCHESTER, NEW YORK

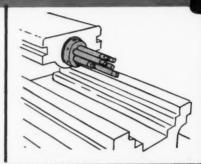
another reason why J&L turret lathes produce -

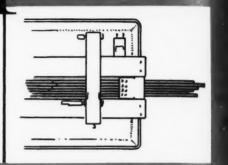
MORE CHIPS PER TOOL

MORE PIECES PER HOUR

MORE PROFIT PER JOB

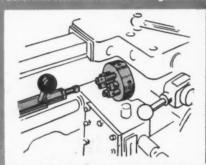


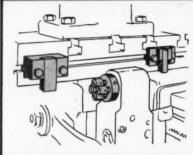


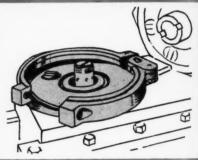


Headstock, solid one-piece casting—extra heavy sections. Wide stable bed. Hardened and ground steel ways.

Positive, accurate stops for hexagon turret.







Positive, accurate stops for carriage and cross slide

Accurate, positive turret indexing.

MORE ACCURACY

The headstock is cast separately in one piece, with extra heavy sections to dissipate heat and

minimize distortions. Bed is a heavy sectioned casting, with shoulders the full length for accurate alignment of the ways with the headstock.

The replaceable hardened solid steel ways are precision ground—parallelism is held to .0003 in both width and thickness, their entire length. All cuts (within rated capacity) taken on or between bedways.

All feeds are disengaged against easily set positive stops, through positive metal-to-metal contact.



Turret rotates on hardened, ground and lapped center pin — bearing surfaces are hand scraped. Locking pin and bushing provide solid, flat abutments with maximum contact area.

P.S. These machines will pay for themselves quickly through savings in direct costs alone. Write to Dept. 710 for Catalog.

"World's most accurate and powerful turret lathes"

RAM TYPES: Bar, 11/2" to 41/2", Chuck, 10" to 12".

SADDLE TYPES: Bar, 21/2" to 5", Chuck, 12" to 18".

JONES & LAMSON

Machine Tool Craftsmen
Since 1835

UNI

Lates

one of

great servi

inch Jac

Indu:

Hart:

JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A.

TURRET LATHE DIV.

136-MACHINERY, August, 1952



UNPARALLELED GRIP from parallel jaws

Latest And Greatest In Collet Design! Tool engineers and machine tool builders praise the Jacobs Rubber-Flex Collet as one of the outstanding developments in modern tool history. This new principle of collet construction brings you not only great improvements in gripping power, accuracy, and service life, but — for the first time — a collet with a full 1/2 inch capacity range.

Jacobs Chucks are stocked and sold by your ladustrial Supply Distributor.

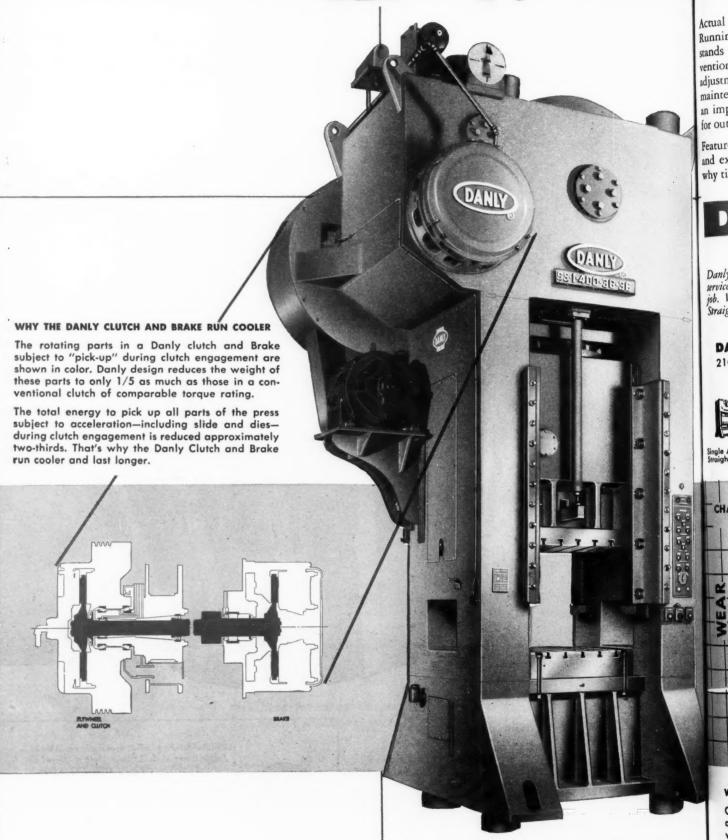
The Jacobs Manufacturing Company, West Hartford 10, Conn.



The Rubber-Flex Collet, previously available in Jacobs Tap and Drill Chucks, is now offered in our popular Spindle Nose Lathe Collet Chuck—offering features never before obtainable in a nose type Lathe Collet Chuck.

JACOBS

when you buy presses to



A Danly 400 ton Single Action One Point Straight Side Press equipped with the Danly Cool-Running Clutch. Outboard mounting of both clutch and brake permit renewal of friction discs in less than 30 minutes.

Straig

es take a close look at the drive

Actual production tests show that the new Danly Cool-Running Clutch, an exclusive Danly Press feature, withstands up to 7 times more engagements than a conventional press clutch before it is necessary to make adjustment for lining wear. The resulting reduction in maintenance and press down time for clutch take-up, an important factor in press operating costs, accounts for outstanding savings.

Features like this—together with automatic lubrication and extra rigid precision construction—are the reason why time and cost conscious production men specify . . .

DANLY PRESSES

Danly's complete engineering staff is at your service to help you select the best presses for your job. Write today—and ask for the Danly Straight Side Press Catalog.



DANLY MACHINE SPECIALTIES, INC. 2100 South Laramie Avenue, Chicago 50, Illinois

It costs less to run a DANLY PRESS!











Single Action

ofeed

Underdrive Single, Double,

Gap Frame

Double Action Straight Side

CHART SHOWING EFFECT OF ON RATE OF CLUTCH	/ / / /
	1 1 1/1/1/
2	TO VXXXX
3	
	ZONE OF DISINTEGRATION
	I (X/X/
TEMPERATURE	
多数数数数数数	



MECHANICAL PRESSES ... 50 TO 3000 TONS

HYDRAULIC METALWORKING EQUIPMENT

WHY DANLY FRICTION DISCS LAST UP TO 7 TIMES LONGER

Chart shows how heat causes disintegration of lining in a press clutch. The steep slope in the curve shows how wear rapidly increases with temperatures.

The cool running Danly clutch generates less heat and the small amount generated is rapidly carried off by a continuous blast of forced air.

Normal operation of a Danly Cool Running Clutch is only 35° above room temperature!

CATERPILLAR GETS ORDERS OUT FASTER

...with the help of TEXACO REGAL OIL (R&O) in hydraulic mechanisms

To maintain production and meet delivery dates, machines at Caterpillar Tractor Co.'s plants must keep working. Unscheduled stoppages of hydraulic mechanisms, for example, simply cannot be tolerated. So quality comes first in choosing a hydraulic medium. Texaco Regal Oil (R&O) has proved ideal.

For Caterpillar, as for other quality-wise manufacturers, Texaco Regal Oil (R&O) assures: 1) clean hydraulic systems; 2) smooth, uninterrupted operation; 3) protection of internal parts against rust; 4) longer operating periods between drains and overhauls; and 5) lower maintenance costs.

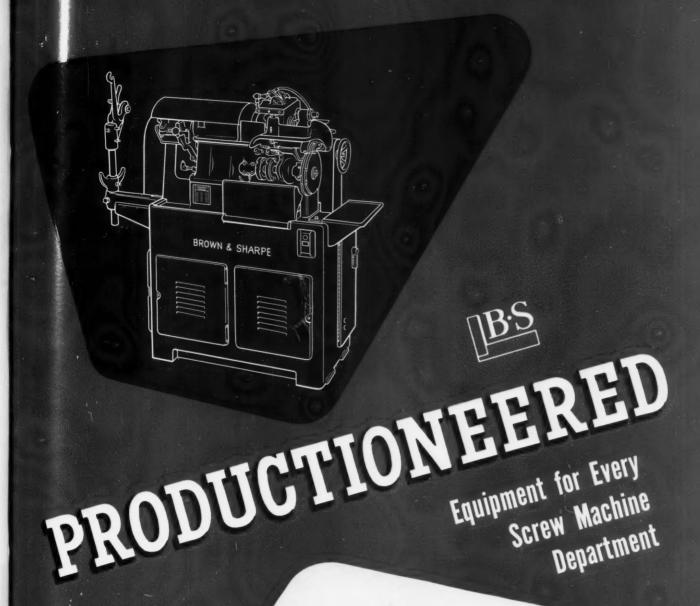
Texaco Regal Oil (R&O) is specially refined from choice base stocks, then processed and fortified with special Texaco additives. Texaco Regal Oil (R&O) is thus more than ten times more resistant to oxidation than ordinary turbine-quality oils, gives far greater protection against rust and sludge, and will not foam.

There is a complete line of Texaco Regal Oils (R & O) approved by leading hydraulic manufacturers. A Texaco Lubrication Engineer will gladly show you how they can improve performance and reduce costs in your plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

CATERPILLAR machines and earthmoving equipment are vital "arms" for America's defense. Their production brings into use a host of machine tools — presses, drills, automatics, and hones like the one in the picture. Where these are hydraulically controlled or operated, *Texaco Regal Oil* (R & O) as the hydraulic medium assures clean, trouble-free operation.

TEXACO Regal Oils (R&O)

for Fifty Years



O)

ns

nust ulic olerulic eal.

inst inst ins ins ists. ned irtigal

re-

lity ınd

ils

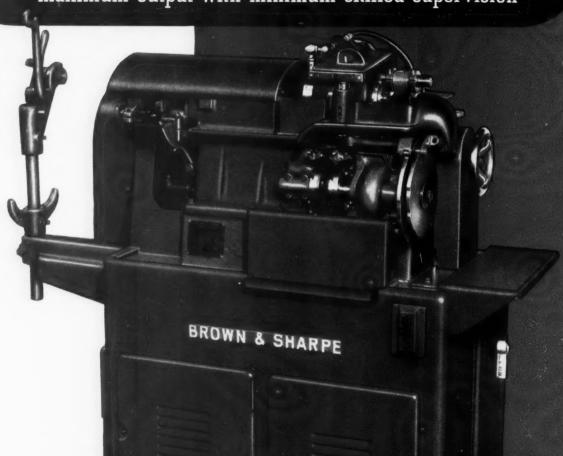
acdly

nd

of in With maximum production dependent upon your selection of the right machine for the job, and the right tools for the machine, it pays to give first consideration to the comprehensive line of screw machines and tools offered by Brown & Sharpe. This equipment is specifically designed for maximum productivity — "Productioneered" to maintain steady high-level output and uniform accuracy with a minimum of skilled supervision.



maximum output with minimum skilled supervision



AUTOMATIC PINION TURNING MACHINE

If your manufacturing calls for high-level production of close-tolerance, fine-finish assemblies such as clocks, timers or military fuses, the Brown & Sharpe Automatic Pinion Turning Machine can be doubly valuable to you. It equips you for volume production of extremely uniform staffs and pinions . . . and it relieves your need for expert pinion turning specialists. Designed with simple, accuracy-protection features such as a tool adjusting dial indicator on swing arm, permanent-contour circular-formed single-point tools, and individual micrometer stop on each tool. Takes stock to ¼" diam.

Brown & Sharpe

BS

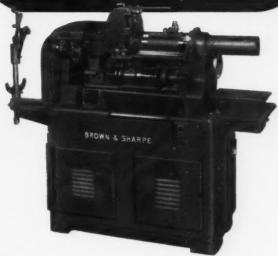
for higher production, greater efficiency



AUTOMATIC SCREW MACHINES

Uniformly rapid non-cutting movements combined with high cutting efficiency make these Brown & Sharpe Automatics consistently high producers. No. 00G takes stock to 36 dia., No. 0G to 36 dia. and No. 2G to 36 or 36 dia. New No. 4 takes stock to 36 dia. (to 36 where work permits).

for smooth-end cutting-off in a single operation

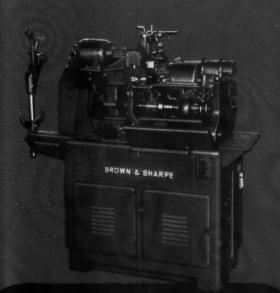


AUTOMATIC CUTTING-OFF MACHINE Opposed Spindle Type

Designed to produce form and cut-off work with no teat on the cut-off end. Work is held securely, not only in the work spindle, but also in the opposed spindle. Wide range of production rates from $\frac{3}{4}$ second to $\frac{45}{2}$ seconds per piece. Takes stock to $\frac{3}{4}$ " dia.

AUTOMATIC SCREW THREADING MACHINE

Small parts requiring threading, forming, cutting-off and slotting operations can be produced on this machine at unusually high production rate and minimum unit cost.



PRODUCTIONEERED

for high speed production of small screws, pins, bushings

NEW! HAND SCREW MACHINES

Fast and profitable for small quantity runs of bar work and second operations, these machines use many of the same tools, collets and fingers as the automatics. Worthwhile addition to any screw machine department. Three sizes, Nos. 00, 0, and 2, take stock to %" dia., %" dia. and 1" dia. respectively.



for simpler set-ups, smaller-quantity runs



PRODUCTEON HARAD

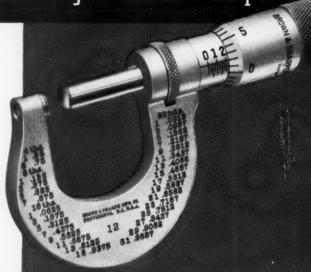
to maintain accuracy of machine output

NEW

BROWN & SHARPE MICROMETERS

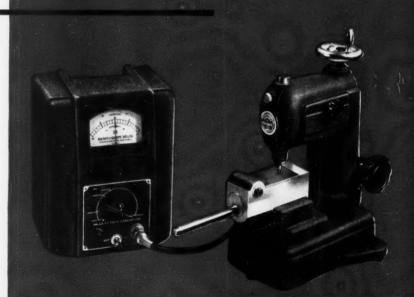
The ease of handling, clarity of reading and unvarying accuracy of the new improved Brown & Sharpe Micrometers give them added value in preventing high rejection rates under today's stepped-up production.

stepped-up production.
Advanced features include carbide measuring faces, dull chrome finish, one-piece stainless steel spindle with hardened, ground threads, simplified adjustments.



BROWN & SHARPE ELECTRONIC GAGING EQUIPMENT

This equipment permits precision gaging and inspection, at high speed, with human error practically eliminated. It amplifies gage measurements 1800 to 18,000 times . . . enables operators to read ten-thousandths as easily as inches, and as fast as parts can be handled.



WE URGE BUYING THROUGH THE DISTRIBUTOR

BROWN & SHARPE SCREW MACHINE TOOLS

Strong, durable, simple in design and easy to adjust . . . Brown & Sharpe Screw Machine Tools provide maximum production, accurate work and good finish at low cost. Made in wide ranges of types and sizes for external turning, for holding internal cutting tools, for threading, knurling, forming and cutting off.

Brown & Sharpe 185

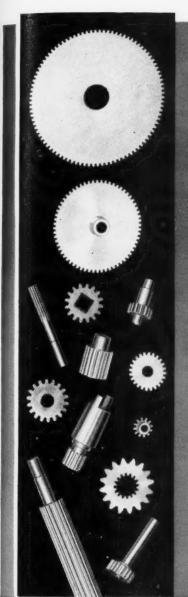
Milling Machines • Grinding Machines • Screw Machines • Cutters Machine Tool Accessories • Machinists' Tools • Johansson Gage Blocks Electronic Measuring Equipment • Permanent Magnet Chucks • Pumps

BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U.S.A.

PRINTED IN U.S.A.







ACCURACY-LOW COST-HIGH OUTPUT



- (1) Precision? Yes, but . .
- (2) Gear output and (3) low gear cost do NOT have to be sacrificed for the sake of maximum precision.

Used by leading makers of precision instruments for the armed services, Michigan's famed "861" gear shaver gives the gear producer all 3: accuracy, low cost, and high output.

Since the day—now a quarter century ago—when Michigan Tool first introduced gear shaving as industry's solution to producing better gears at lower cost, Michigan shaving

machines have been specifically designed to meet the needs of particular fields.

In the precision instrument gear field—for gears up to 4" diameter, and 1" face—the gear finishing machine is the "861". Ask for Bulletin #861-4B.



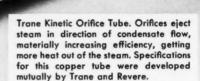


MICHIGAN TOOL Company

DETROIT 12 MICHIGAN, U. S. A. TO

Revere-Trained Copper

HELPS TRANE CONTROL HEAT!





Trane Type SDS Coil containing Kinetic Orifice Tubes, for heating use.

One of Revere's customers is the famous Trane Company, which makes heating, cooling and air-conditioning equipment for home, industrial, marine and similar applications. Trane relies on copper for tubes, because of high heat conductivity, resistance to corrosion and easy workability.

Like so many other Revere friends, Trane maintains close relations with the Technical Advisory Service, collaborating with it in developing specifications, studying specific corrosive conditions, and other matters of mutual interest.

For example, take the Kinetic Orifice Tube, a Trane design to overcome certain old handicaps found in the tube-within-a-tube steam distributing system. The Kinetic Orifice utilizes a jet action to accelerate the flow of condensate by discharging the steam in the direction of condensate flow. To produce such orifices in a copper tube requires a combination of shearing and flaring, and at first it was thought that the temper required for these operations would be so soft as to make it difficult to maintain the required straightness. However, study by both organizations finally developed a temper both workable and strong, now proved by several years of use.

If you are not now collaborating with the Revere Technical Advisory Service, perhaps it would be to your advantage to do so. Call Revere.



Trane projection-type Unit Heater employs copper tubes for both high pressure and low pressure work.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801 230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere

SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY



Coil for projection-type Unit Heater. The easy bendability of copper tube is a decided asset in forming the circular coils.





PRODUCT INFORMATION SERVICE

Use the postage-free postcard below for further information on New Catalogues described in the August, 1952, issue of MACHINERY. Circle key number of item in which you are interested and print name and address on postcard.

NEW CATALOGUES

RESISTORS—Ward Leonard Electric Co., 115
MacQuesten Parkway South, Mount Vernon,
N. Y. Catalogue 15, containing 64 pages of
comprehensive information on the company's
line of Vitrohm power type wire-wound resistors, including selection and application
data. Can be obtained if request is made on
company letter-head direct to the above
address.

UNIFIED TAPS — Besly-Welles Corporation, Beloit, Wis. Manual containing information on taps for British-American unified threads and data on tap drill sizes, selection of taps for various classes of work and kinds of material, etc. Can be obtained if requested on a company letter-head, addressed directly to the corporation.

RESISTANCE WELDING EQUIPMENT — Multi-Hydromatic Welding & Mfg. Co., 23171 Groesbeck Highway, East Detroit, Mich. 48-page catalogue descriptive of resistance welding equipment — units, machines, fixtures, and presses. The booklet is available to metal fabricating executives upon request direct to the company.

V-DRIVES.—Maurey Mfg. Corporation, 2915 S. Wabash Ave., Chicago 16, Ill. 44-page catalogue on fractional horsepower V-drives and drive parts. Can be obtained by writing to the Catalogue Department of the above corporation on a company letter-head, specifying your position.

INDUSTRIAL NOZZLES—Binks Mfg. Co., 3122 Carroll Ave., Chicago 12, III. Bulletin 5200, describing industrial spray nozzles for metal cleaning, Bonderizing, spray quenching, etc. Can be obtained if requested on a company letter-head direct to the above address.

MEASURING EQUIPMENT—Micrometrical Mfg. Co., 345 S. Main St., Ann Arbor, Mich. Wall chart listing the working range of Profilometer equipment for measuring surface roughness in micro-inches. For a copy, direct request on company letter-head to above address.

CUTTING TOOLS — Ekstrom, Carlson & Co., 1400 Railroad Ave., Department M-4, Rockford, III. Bulletin SF-4, on Ecco spiral flute router bits. Can be obtained if requested on a business letter-head, addressed directly to the company.

CONTROL INSTRUMENT—Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Philadelphia, Pa. Bulletin 1501, describing "Electronik" strip chart program controllers for use in heat-treating and numerous other industrial processes in which a system of automatic regulation of time and temperature is required.

SHELL MOLDING PROCESS—Monsanto Chemical Co., Springfield, Mass. Bulletin 77, entitled "The Shell Molding Process—A New and Proved Casting Method for the Foundry Industry," describing the merits of the shell molding process, equipment and material requirements, and practical considerations. 2

INSTRUMENT SENSING UNITS AND ACCES-SORIES—Wheelco Instruments Division, Barber-Colman Co., Rockford, III. Bulletin TC9, giving technical information concerning thermocouples, radiation detectors, resistance bulbs, and other accessories for indicating, controlling, and recording instruments. TABLETTING PRESSES—F. J. Stokes Machine Co., Philadelphia, Pa. Catalogue 800, describing the complete line of Stokes tabletting presses used in powder metal processing, in plastics preforming and molding, in the manufacture of abrasives, etc.

INVESTMENT CASTINGS — Precision Metalsmiths, Inc., Cleveland, Ohio. Booklet entitled "Pour Yourself an Assembly," describing a range of uses for investment castings, as well as the company's facilities for design and production.

TESTING INSTRUMENTS—Bristol Co., Waterbury, Conn. Bulletin P-1247, descriptive of a

portable Diesel engine pyrometer designed for test purposes and for installations where no permanently mounted pyrometer is available.

RIVET SELECTOR—Chicago Rivet & Machine Co., Bellwood, Ill. Pocket-size rivet selector giving data on the necessary rivet clinch allowance, recommended assembly hole diameter, and rivet head diameter for any proposed size and type of rivet.

ALUMINUM MILL PRODUCTS — Reynolds Metals Co., Louisville, Ky. Booklet describing the advantages of wrought aluminum alloys and containing an alloy selection guide, as well as fabricating and finishing information. 15

WELDING—Eutectic Welding Alloys Corporation, Flushing, N. Y. 64-page manual entitled "Tool and Die Salvage Welding," discussing salvage problems and more efficient usage of improved tool and die welding procedures, 16

MATERIALS-HANDLING — Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, Ohio. Booklet 2008-H, containing engineering and application data on Tramrail overhead materials-handling equipment. 17

LAY-OUT TEMPLATES—Repro-Templets, Inc., Oakmont, Pa. Booklet presenting a master planning file whose purpose is to provide plant lay-out engineers with a basic file of machine and equipment templates in 1/4-inch scale. 18

POWER TOOLS—Boice-Crane Co., Toledo, Ohlo. Catalogue 52, containing over 50 pages of





BUSINESS REPLY CARD FIRST CLASS PERMIT NO. 68, SBO, SA.S. P. L. & R., NEW YORK, M. Y.

MACHINERY

148 LAFAYETTE STREET

NEW YORK 13, N. Y.

READERS' SERVICE DEPT.

CONTOUR FORMERS—Cyril Bath Co., Cleveland, Ohio. Booklet describing the Bath contour former and illustrating forming operations on complex parts for the transportation and aircraft industries. 22

GEAR SHAPERS—Michigan Tool Co., Detroit, Mich. Bulletin 1800-52, describing the improved line of Series 1800 Shear-Speed radial gear shapers. Latest applications are illustrated. 23

BELT GRINDING ATTACHMENTS — Buckeye Tools Corporation, Dayton, Ohio. Folder on attachments for Buckeye horizontal grinders, which may be adopted to other makes of grinders of the proper type and speed, 24

ELECTRICAL EQUIPMENT CRANES—Harnischfeger Corporation, Milwaukee, Wis. Bulletin C5-1, covering the P & H line of electrical equipment designed exclusively for overhead crane service. 33

CUTTING OILS—E. F. Houghton & Co., Philadelphia, Pa. Booklet entitled "Getting Down to Cases on Metal Cutting," giving examples of applications of Antisep all-purpose base. 35

METAL STAMPINGS — Dickey-Grabler Co., Cleveland, Ohio. Catalogue descriptive of metal stampings, tools and dies, and marking devices manufactured by the company. 36

INVESTMENT CASTING — Investment Casting Co., Newark, N. J. Booklet explaining how investment casting has been used to eliminate machining, tooling, and assembly costs.

ALUMINUM—The Aluminum Association, New York City. Booklet consisting of a glossary of terms for aluminum sheet and plate, and aluminum extruded and tubular products. 39 WELDED STEEL TUBING — Armco Steel Corpora, Middletown, Ohio. Manual entitled "How to Fabricate Armco Welded Steel Tubing," giving information on the machines and accessories available for tubing fabrication...40

IRON CASTINGS — International Nickel Co., Inc., New York City. Bulletin consisting of a glossary of terms for producers and users of iron castings.

GAS BURNERS—Selas Corporation of America, Philadelphia, Pa. Bulletin SC-1000, on multiport flame type gas burners for use in heat processing.

SCREWS—Parker-Kalon Corporation, New York City. Catalogue 600-A containing 63 pages on P-K self-tapping screws, socket screws, etc. 48

TOOL BIT COLLETS—DoAll Co., Des Plaines, III. Bulletin 51-828, describing a tool bit collet for boring, facing, turning, and fly cutting.

FASTENERS — Prestole Corporation, Toledo, Ohio. Leaflet 215-A-5M, on Prestole bridge spacers for many fastener applications. 52

CASEHARDENING — Surface Combustion Corporation, Toledo, Ohio. Leaflet on standard batch furnaces for casehardening steel. 53

EYELETS — Edward Segal, New York City. Booklet telling just what eyelets are, how they should be selected, and how best employed. 56

RIVETS — Brainard Rivet Co., Girard, Ohio. Bulletin on the company's line of standard and special small rivets, pins, studs, etc. 57

WELDING OF MAGNESIUM — Dow Chemical Co., Midland, Mich. Reprint entitled "Inert-Gas-Shielded Metal-Arc Welding of Magnesium." 59

SELF-LOCKING FASTENERS—Elastic Stop Nut Corporation of America, Union, N. J. Catalogue presenting case histories and engineering data for the "Rollpin" self-locking fastener. 60

COMPARATOR GAGE — Moore Products Co., Philadelphia, Pa. Bulletin 8005-5, explaining the installation, operation, and maintenance of Moore pneumatic comparator gages. 62

SET-SCREWS—Set Screw & Mfg. Co., Bartlett, III. Catalogue containing data on various types of standard and self-locking set-screws. 63

Product Information Service

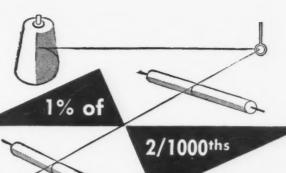
Use the postage-free postcard below for requesting further information on New Catalogues. Simply circle the numbers of the items in which you are interested. Please print your name and address.

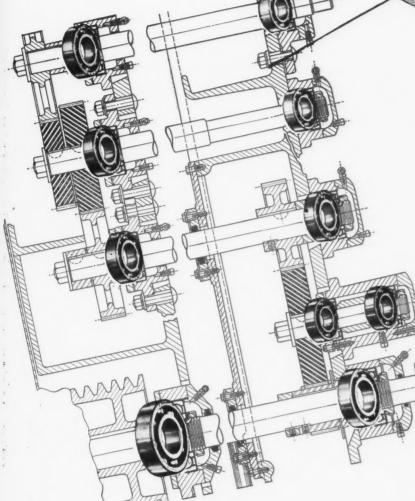
	01	0	0	0	0	0	:	2	:		1	:	;
tion	=	20	30	40	50	9		M-8/52					
information.	0	19	29	39	49	59	:	×			9		
	00	00	28	38	48	58	:						State
you wish further	7	17	27	37	47	57	:						
wish	9	91	26	36	46	99	4 4	PRINT					Zone
	2	10	25	35	45	55				8 8 0			
which	**	4	24	34	44	54		PLEASE					
	3	13	2	8	~	23			-				
ers		-	23	33	43	5	63		1				
numbers	7	12	22	32	42	52	62		44				
den numbers	-	-	21	3	4	5	5		Hom	Title	F	Stree	5





SETUP
that holds tolerance to





If you are familiar with machine designing, you'll consider this a "neat" piece of engineering. Such precision is actually achieved on mammoth synthetic thread twisters developed by Whitin Machine Works. The twisters stretch thread to a uniform .002 of an inch diameter and hold that diameter to within a 1% tolerance down a 40 foot line of spindles.

A sectional view of the head end which controls the "feed rolls" and "draw rolls" shows the Fafnir Ball Bearing setup that helps to keep their relative velocity absolutely constant...a "must" to produce such an amazing degree of accuracy. The Extra-Precision ball bearings used are made by highly trained operators on special equipment controlled by elaborate inspection devices.

Whatever your bearing problem, a few minutes spent with a Fafnir representative may help you solve it equally as successfully. Fafnir's experience is not limited to just a few industries . . . it's industry-wide. The Fafnir Bearing Company, New Britain, Conn.

Bearings used

Fafnir Extra-Precision Ball Bearings of the 200 (Light) and 300 (Medium) Series are shown in the ten locations above.

FAFNIR BALL BEARINGS



Standard Radial
Ball Bearings



Power Transmission Units . . . all types and sizes



Wide Inner Ring Ball Bearings with Mechani-Seals

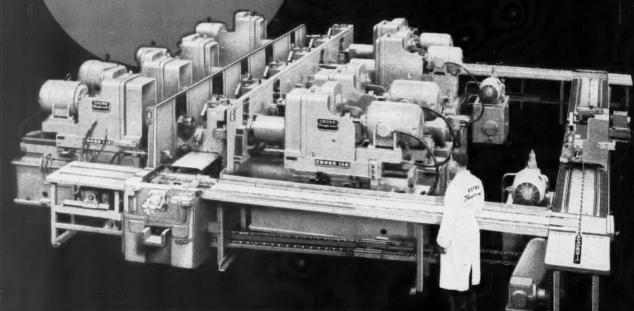
MOST COMPLETE



LINE IN AMERICA

Bores,
Hollow Mills
and Trepans
Tank Idler Arms

Another Transfer-matic by Cross



- * Core-drills and reams small hole and hollow mills boss around small hole; rough and semi-finish bores large hole and trepans groove on one end
- * Cast Armor material—Rockwell C-36.
- * Six and one-half pieces per hour at 100% efficiency.
- * Six stations—one for loading, five for machining
 —with automatic transfer from station to station.
- * Palletized work holding fixtures hold part securely for all operations with integral conveyor returning fixtures from last station to loading station.
- ★ J.I.C. standard electrical and hydraulic construction with stranded wire.
- ★ Pre-set tools and Cross Cutter-Drive reduces downtime.

Established 1898

THE CROSS

DETROIT 7, MICHIGAN

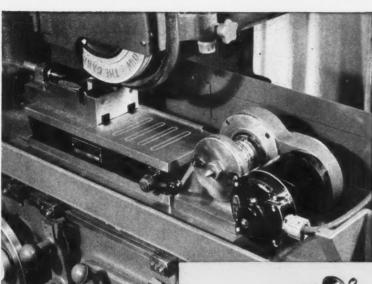
Special MACHINE TOOLS

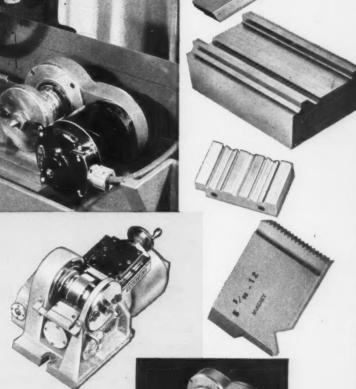




Equip for Crushtrue Grinding to Speed Production and Cut Costs







You can produce the kind of work shown here faster and more economically with Sheffield Crushtrue Dressing Devices, and Crushtrue Dressing Rolls.

Dressing the grinding wheel by Crushtrue equipment (1) is very much faster than diamond dressing, (2) increases the cutting capacity of the wheel, (3) greatly reduces generated heat in grinding, (4) minimizes the tendency of the wheel to "load up" (5) reduces the actual grinding time as much as 75%.

Idler, Motorized and Self-truing Crushtrue Devices are available. Your selection will depend upon the work you do and the grinding equipment you have.

Crushtrue rolls for standard threads can be shipped immediately from a Sheffield "bank." Rolls for special forms for users engaged in long run production schedules can also be included in this stock on hand. Users send in rolls to be reground and immediately replacements from Sheffield's bank are forwarded at nominal cost. This relieves the user from the expense of ever having to buy new rolls.

Write for information on the Sheffield "Crushtrue Roll Bank" and specifications on these Crushtrue Devices.



Sheffield



corporation

Dayton 1, Ohio, U. S. A.

GAGES * MEASURING INSTRUMENTS * MACHINE TOOLS



IT'S SHATTERPROOF!

Double welding makes Starrett SAFE-FLEX Power Hacksaw Blades the safest, straightest cutting, long-lasting blade ever made. Use it with complete safety for your toughest cutting jobs — for multiple sawing work or interrupted cuts. Use it with greater economy for all your power cutting. Step up the speed and feed. Watch it cut clean and fast with no danger of shattering.

Double welded construction, an entirely new development in hacksaw design, gives Starrett SAFE-FLEX blades the perfect combination of hardness and toughness. The cutting edge of hard, high speed steel is reinforced with a medium hard, extra strong center and backed up with a super-tough steel back. See what the new Starrett SAFE-FLEX blade can mean to you in more and straighter cuts per blade. Order a supply today.

Here's what DOUBLE-WELDED SHATTERPROOF CONSTRUCTION MEANS Super Tough Steel Back For Extra Toughness.

Hard "High Speed" Edge For High Production — No Tooth Stripping.

Medium-Hard Steel Center For Extra Strength.



THE L. S. STARRETT COMPANY
Athol, Massachusetts, U. S. A.

MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK HACKSAWS, BAND SAWS and BAND KNIVES



- Prompt delivery
- Dependable service
- Quality products





MACHINERY'S DATA SHEETS 711 and 712

COMMON CENTERLESS THROUGH-FEED GRINDING TROUBLES AND HOW TO CORRECT THEM-1 COMMON CENTERLESS THROUGH-FEED GRINDING TROUBLES AND HOW TO CORRECT THEM-2

0

0

0

0

	Grinding wheel too soft (breaks down too readily).
Out-of-round work	Work set too high, causing loss of contact.
	Work set too low (too near center line of wheels).
Chatter	Grinding wheel out of balance.
	Too steep angle on work blade causes excessive horizontal pressure on work blade, resulting in bending
	Work blade too thin.
	Work blade not properly clamped.
	Too hard or too fine grind- ing wheel causing bouncing action on work blade (not free enough cutting).
	Too heavy feed which causes intermittent contact between the grinding wheel and work.
	Too little pressure or brak- ing force on feed wheel.
	Loose rotating machine parts or driving belts.
Feed lines	Excessive pressure built up on exit side of grinding wheel.

								•	
Suggested Corrective Step	Check alignment of exit side guides.	Increase lubricating properties of coolant (increase concentration of mixture or use a more oily mixture) or Use work blade of softer material than work being ground.	Correct the alignment of work guides.	Correct the alignment of work guides.	Correct the alignment of work guides.	Correct the alignment of work guides.	Check inclination and swivel angle on regulating wheel to insure they are the same.	Leave more stock for finishing or	Use pressure roller on top of the work.
Probable Cause	Guides on exit side of wheel not properly aligned.	Particles of abrasive, chips or dirt imbedded or fused to work support blade.	Work guides on entrance side of machine are deflected towards the regulating wheel.	Work guides on exit side of machine are deflected towards the regulating wheel.	Work guides on both entrance and exit sides of machine are deflected towards the regulating wheel.	Work guides on both entrance and exit sides of machine are deflected towards the grinding wheel.	Improperly trued regulating wheel face.	Insufficient driving power between feed wheel and work which causes work to stop rotating or to rotate intermittently before work has sparked out.	
Trouble	Feed lines (continued)	Scored work	Taper on front end of short work piece	Taper on rear end of short work piece	Barrel shaped work (taper on both ends of short work piece)	Hollow or concave shape on face of short work piece		Flat spots on work (usual- ly found on heavy pieces where light stock removal is attempted)	

The Spindle Vou Want



In This Complete Catalog

For speed, precision, endurance, your best choice is an Ex-Cell-O Grinding Spindle. You'll find one to suit your needs in the big, 80-page Ex-Cell-O Catalog 25962, supplied with price list on request.

● Leading grinder manufacturers install Ex-Cell-O Precision Spindles as original equipment. You can improve the performance of your grinders with Ex-Cell-O Precision Spindles. They are rigid and smooth-running, permit heavy cuts without chatter, require no lubrication or adjustment. All are fitted with precision ball bearings manufactured by Ex-Cell-O.



DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS
RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT
AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT



Single-body, belt-driven internal grinding spindle.



Double-body, belt-driven internal grinding spindle.



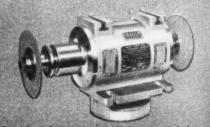
65,000 rpm high frequency inbuilt motor spindle.



25,000 rpm high frequency inbuilt motor spindle.



Totally enclosed inbuilt motor surface grinder spindle.



Precision inbuilt motor spindle for cutter grinder.

Vertical precision spindle with inbuilt motor.









Only Lucas
CAN MAKE A LUCAS
... but others are lending a hand

This is one of America's outstanding plants of its kind, and every tool in it is there for the production of Lucas Horizontal Boring, Drilling and Milling machines. This specialization means a greater output of critically needed machines for the defense program.



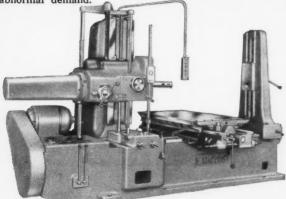


Thousands of man hours of exclusive experience on Lucamills enable us to keep quality abreast of quantity.



Many an outside supplier is working 'round the clock on component parts to supplement our own efforts. Final assembly and inspection is still carried on in our own plant

We still have to keep many a loyal customer waiting, because our output like that of all other defense machine suppliers has been governed by regulations plus an abnormal demand.



Your inquiry and your order are still as welcome as ever. When you do get the Lucas you need you'll find it your No. 1 money maker — the most used machine in the shop.



LUCAS

Precision

HORIZONTAL BORING, DRILLING AND MILLING MACHINES LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO. CLEVELAND 8, OHIO

Metallic Cutting



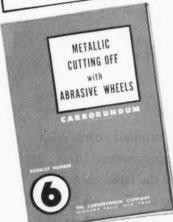


Only GARBO

"Carborundum", "Aloxite" and "MX" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, N. Y.

258—MACHINERY, August, 1952





Abrasive Cutting Off Wheels by CARBORUNDUM are from 12 to 20 times faster than steel saws, on all kinds of metals—produce smoother, more finished, better quality cuts than you can get with flame cutting or shearing—and they do the job at lower overall cost than conventional methods. Rubber bond wheels as thin as five thousandths—resinoid bond wheels as thin as ½2"—"MX" wheels as thin as ½2"—there is a wheel by CARBORUNDUM for every high speed production operation in your shop.

ORDER FROM YOUR CARBORUNDUM DISTRIBUTOR TODAY. He's your best bet for complete stocks, prompt delivery, experienced counsel on latest developments in the field. You'll find him listed in the yellow pages under "Abrasives." Phone him today—it's to your profit!

This "tell-all" booklet is FREE!

THE CARBORUNDUM COMPANY, Dept. M 81-82 Niagara Falls, New York

Please send me, FREE, your booklet No. 6, "Metallic Cutting Off with Abrasive Wheels."

NAME AND TITLE

COMPANY

STREET AND NUMBER

CITY

NE STATE

RUNDUM

offers ALLabrasive products...to give you the proper ONE

MACHINERY, August, 1952-259



NEW BRITAIN Copying Lathe

Chips have been a major problem on conventional lathes for a hundred years. With the advent of carbide tools, the chip problem has been even more serious. In designing the new New Britain +6F+ we have, in effect, turned the lathe on its side. The conventional bed has been eliminated, and the copying saddle in which the cutting tool is mounted, is below the spindle. The flow of chips from the fast-cutting carbide tool, falls entirely free, and the chip pile accumulates through the back of the machine for convenient removal.

The New Britain **+6F+** copying lathe operator handles the controls, loads and unloads using the power operated tail stock, sets up and adjusts template or prototype, *all from the front of the machine*.

For the new developments in metal turning efficiency, consult your New Britain Sales Engineer first. You'll find it literally true that New Britains are *machines for making progress*.

AUTOMATIC BAR AND CHUCKING MACHINES • PRECISION BORING MACHINES LUCAS HORIZONTAL BORING, DRILLING AND MILLING MACHINES NEW BRITAIN +GF+ COPYING LATHES

4GF4

A COMPLETELY
NEW PRINCIPLE
PRODUCES A
MAJOR IMPROVEMENT
IN LATHE DESIGN.

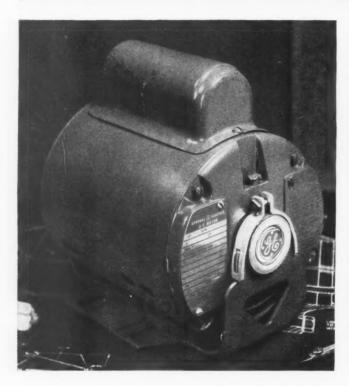
The New Britain +6F+ copying lathe, created by George Fischer Limited, Schaffhausen, Switzerland. Adapted to American power input requirements and manufactured in the United States by New Britain Machine. New to America, the New Britain +6F+ is the result of fourteen years' development. Hundreds are in successful use the world over.

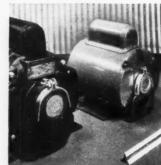
NEWBRITAIN

Automatics

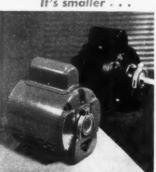
THE NEW BRITAIN-GRIDLEY MACHINE DIVISION THE NEW BRITAIN MACHINE COMPANY NEW BRITAIN, CONNECTICUT

Designer's





It's smaller . .



better looking . . .



lighter . .



more versatile!

SI

All-new G-E fhp motor opens up new ways to improve your product

Now—with this radically new line of General Electric Form G fractional-horsepower motors—you can free yourself of former limitations, design new and more saleable features into your products. More easily and at less cost, too!

Smaller size and lighter weight let you put power into minimum space, cut storage and transportation costs, make installation and handling easier. Functional design aids your product's appearance. And allangle operation often permits use of this generalpurpose motor in place of more costly specials.

The new G-E Form G embodies an entirely new concept of motor design and brand-new features that make it quieter, tougher, easier to use, and longer-lasting. Check Bulletin GEA-5567. General Electric Co., Schenectady 5, N. Y.

GENERAL ELECTRIC

PRODUCT HIGHLIGHTS

BUILD IN A STANDARD G-E MOTOR TO FIGHT DIRT AND CORROSION

Both types of G-E Tri-Clad* totally-enclosed motors—the fan-cooled (shown) and the non-ventilated—are standard, "off-the-shelf" motors. That means these integral-hp motors are easier to order, cost less, can be shipped faster. They have all the protective features needed for machines that operate in atmospheres containing dirt, oil, or metallic dust. See Bulletin GEA-4400.





VIBRATION-MEASURING EQUIPMENT HELPS YOUR QUALITY CONTROL



Keep vibration within allowable limits as a quality-control aid with one of these G-E vibration-measuring instruments. Shown are (top right) general-use dialtype indicator; (left) more accurate light-beam-type unit; and recording vibrometer. For full data on these valuable development and inspection tools, check Bulletin GEC-853.

NEW G-E BOOKLET SIMPLIFIES YOUR SELECTION OF CONTROL COMPONENTS

Here's a valuable new addition to your reference file that quickly summarizes the highlights on a wide variety of G-E motor starters, control accessories, and electronic devices. For each of the many components covered, the booklet gives ratings, features, typical applications; also lists available bulletins containing more detailed information. See new Bulletin GEA-5781.

11-

al-

at

er-

ric



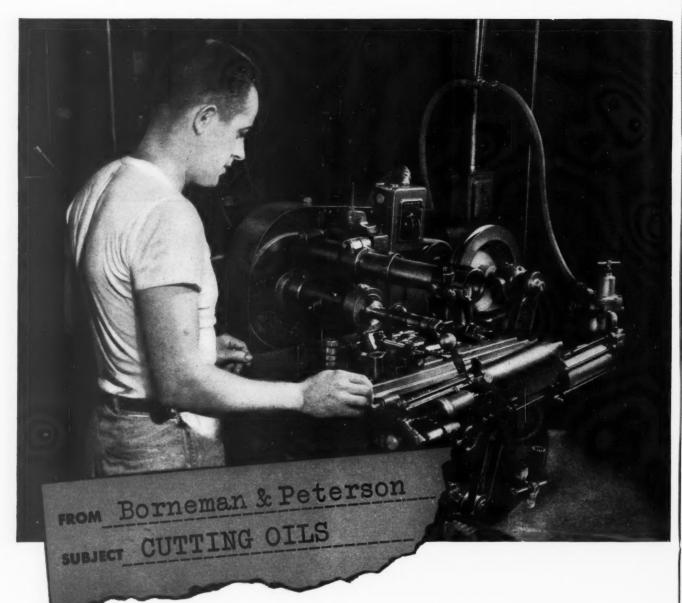
New push-button units high in color-coding flexibility

Machinery manufacturers can change push-button coding colors quickly and easily when they stock the new G-E oiltight push-button line. Simply switch the detachable color ring—and that's all—when you want to change color. Replacing entire units to vary color identification is unnecessary. For maximum flexibility, these rings are available in five colors: black, red, green, yellow, and white. Unit costs are lowered—so is the size of your inventories.

These new units also feature one basic type of contact block, and a variety of interchangeable operators. This "building-block" flexibility makes it possible to assemble the right unit for any design need. And because all of these components are standard, you'll get faster shipment. See Bulletin GEA-5779.



General Electric	Company, Section A668-95
Schenectady 5, N	lew York
Please send me the	e following bulletins
√for referen	ce purposes
X in connection	on with immediate projects
	Tri-Clad Motors Form G Fhp Motors
☐ GEA-5779	Push-button Units
☐ GEA-5781	Control
☐ GEC-853	Vibration-measuring Equipment
PRODUCT ENGINE	ACGRAW-HILL ELECTRICAL CATALOG FOR ERS! You'll find "everything electric" for cturers in the General Electric section.
NAME	
COMPANY	
STREET	
CITY	STATE



Any tiny production improvement looks big when it can be multiplied by acres of machines. But even without that—in an average size screw machine products shop like Borneman & Peterson's at Flint, Michigan—the improvement effected with Cities Service cutting oil registered impressively.

"We were getting fair results," write Borneman & Peterson, "before ever talking it over with a Cities Service Lubrication Engineer."

But they did talk it over, and then tried out his recommendation on a regular job of cutting $\frac{1}{2}$ " x 1" slots in tough tool steel. At once, the use of Cities Service Chillo cutting oil notably improved product quality.

So..."We then tried using Chillo 10 on our threading machines, and found that not only do we get a better thread, but we have increased chaser life approximately 25%."

From there on, still more uses have kept turning up in this shop for Cities Service cutting oil, simply because it distinctly pays off...as it always does when a Cities Service Lubrication Engineer offers pinpointed lubricating recommendations. He draws on the c-o-m-p-l-e-t-e Cities Service industrial line, and on deep, wide experience. You can draw on him by writing CITIES SERVICE OIL COMPANY, Dept. H18, Sixty Wall Tower, New York City 5.

Yo

to

at

lin

for pa



E187ER JOB LS

for Production, Maintenance, Construction by Black & Decker



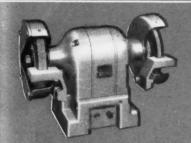
DRILLS—Drill lead holes, bolt holes; drill out broken fastenings; drive twist drills, wood augers, masonry bits, Hole Saws.



SCREW DRIVERS—Drive all types of fasteners in assembly of wood, metal or plastic parts. Do fast disassembly in repair work.



SANDERS — Drive abrasive discs, saucer grinding wheels, "Whirlwind" wire cup brushes for everything from finishing metal to removing rust.



BENCH GRINDERS—Keep all edged tools sharp and clean — grind, buff, burnish and wire brush metal parts. Outstanding modern design.



PORTABLE GRINDERS — Bring the tool to the work; for grinding, buffing, cleaning—where work is heavy, bulky, hard to move.



QUICK-SAWS* — Ten times faster than hand sawing. Make most any cut in most building materials. Built-in depth and bevel adjustments.



HAMMERS—Drive star drills, bull points, chisels—for drilling, channeling, chipping, scaling, light demolition—in all masonry.



PORTO-SHEARS*—Cut sheet metal too tough for hand snips. Speed up jobs where hand snips are too slow Easily follow intricate patterns.



FAST "FACTORY" SERVICE — with genuine parts for B&D Tools from 30 factory - owned - and - operated service branches from coast to coast.

You name the job and there's a Black & Decker Tool to help you do it better, faster, with fewer man-hours, at lower cost! Check the Tools shown on this page—just a sample of more than 100 in the world's most complete line. Then see your nearby Black & Decker Distributor for eye-opening demonstrations—for full details on their easy handling, abundant power, quality construction—for sound advice on any tooling problem. Learn why it pays to "Switch to Black & Decker POWER!"

*Trade Mark Reg. U. S. Pat. Off.



WRITE TODAY for new 1952 B&D Catalog. Gives full details on complete line of tools and accessories. Yours free for the asking! THE BLACK & DECKER MFG. CO., 621 Pennsylvania Ave., Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL



MACHINERY, August, 1952-265

MADISON
-KIPP
fresh oil
LUBRICATION

fed under
pressure
by the
measured
drop!

Illustrated, the Madison-Kipp Model SVH Lubricator on an Ingersoll-Rand XLE Compressor.

.... STANDARD EQUIPMENT ON COMPRESSORS, WORK ENGINES AND MACHINE TOOLS....

Oil under pressure fed drop by drop from a Madison-Kipp Lubricator will definitely increase the production potential for years to come when applied as original equipment on new machine tools, work engines and compressors. There are six popular models for every application. Write for special engineering data for your particular requirement,

- Skilled in DIE CASTING Mechanics
- Originators of Really High Speed AIR TOOLS
- Experienced in LUBRICATION Engineering

MADISON-KIPP CORPORATION

203 WAUBESA STREET, MADISON 10, WIS., U.S.A.

ANCIENS ATELIERS GASQUY. 31 Rue du Marals, Brussels, Belgium, sole agents for Belgium, Holland, France, and Switzerland.

WM. COULTHARD & CO. Ltd., Carlisle, England, sole agents for England, most European countries, India, Australia, and New Zealand.

Jone adial Chaser Die Heads These Die Heads will do an outstanding job on large or small lots, in pitches ranging from extremely fine to coarse multiple Acme. They are versatile tools with an over-all capacity of from No. 8 to 41/4". They require no more than the proper chasers to cut either right- or left-hand threads. No extra equipment is needed. They are easy to install and simple to handle. For almost half a century J&L Dies and Chasers have been the answer to a multitude of threading jobs throughout the world.

Look at these features that make them leaders in their field and give you better threads at lower cost:

STRENGTH

Every part is of solid steel, hardened and precision ground. There are no built-up sections Dependability and ultimate capacity are assured.

All models are built with both concentric and longitudinal float.

DUAL-DIAMETER CONTROL LEVER FOR ROUGHING AND FINISHING CUTS

Heavy rough cuts, followed by light, accurate finish cuts can be taken with the same set of chasers by merely moving the roughing attachment lever. This is often a chaser saver on heavy, coarse pitch jobs, especially where short chamfers are a requirement.

The external micrometer adjusting screw provides simple and precise setting to exact pitch diameter. It is easy to set and maintain sizes well within your thread tolerances.

RAPID CHASER CHANGE-OVER

Chasers are removed for resharpening, or size replacement, by merely removing the front cover of the Die. No tools are required. Charge-over is a matter of seconds — which means more hours available for production.

> Write to Dept. 710 for illustrated catalog and complete information on these and Tangent Chaser Types and Dies for Brown & Sharpe machines.

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A.



DIE HEAD DIVISION

This man can show you . . .



How to make stronger assemblies and save fastening time



Lasting security of fastenings is imperative in assembly of this Fan-Glo Heetaire, to resist vibration and insure rigidity. Seven P-K Type A Phillips Head Sheet Metal Screws fasten the CRS back cover to the welded case—can be easily removed and replaced when necessary. All screws are driven with air-operated driver in ½ minute.



Type A Hardened Sheet Metal Screw, one of five standard types of P-K Self-tapping Screws, shown with Phillips Recessed Head. Made also with slotted head.

Ask a P-K Assembly Engineer how you can improve product strength. Often, a switch to P-K screws gives you a double advantage. You get fasteners that set up tight and *stay* tight. You also get a *simpler* fastening method that makes record savings in assembly time.

The P-K Assembly Engineer's experience is based on more than a million applications of P-K Screws in the nation's best-known products. He can quickly tell you which type, from Parker-Kalon's *complete* line, will help you make better, faster, stronger assemblies, at lower cost.

Today, more than ever, the P-K Assembly Engineer is a good man to have on your production team, showing you the shortcuts in assembly that will help you beat the squeeze on profits. He'll call at your request. Parker-Kalon Corp., 202 Varick Street, New York 14.





Your P-K DISTRIBUTOR has good news. His stocks of P-K Screws are steadily improving. The size and type you need may now be readily available Ask about it. Plan now to make your assemblies with the original, quality-controlled P-K Screws. Remember—"If it's P-K ... it's O.K."

PARKER-KALON®

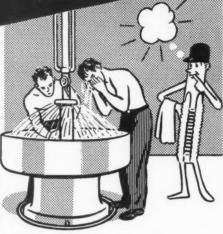


The Original SELF-TAPPING SCREWS

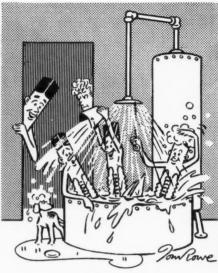
FOR EVERY METAL AND PLASTIC ASSEMBLY







A common problem in the home Faced Production Pete. How could he get his youngsters To wash their dirty feet?



But now, the kids all think it's fun. (What power a genius hath)!
For—You always get a clean-cut job Each time you "take a Bath"!

It's a fact . . . you men in charge of today's production, have steadily increased your specifications for Bath "ground from the solid" Taps on long runs . . . where clean-cut threads, uniformity and speed are essential. Excessive spoilage soon kills a job profitwise and you have found the dependability of BATH stock and special taps to be most important . . . because they give you permanent "thread insurance".

.....

The type of metal, tapping machine used and details of the threading job to be done, effect the selection of the right BATH TAP. Whatever your problem, Bath engineers welcome the opportunity to make recommendations or to design custom taps for unusual work.

Base your judgment on performance . . . and you'll buy BATH TAPS for BETTER THREADS.



INSIST ON BATH TAPS

— PROFIT BY THEIR
PLUS—PERFORMANCE

PLUG AND RING THREAD GAGES . GROUND THREAD TAPS . INTERNAL MICROMETERS

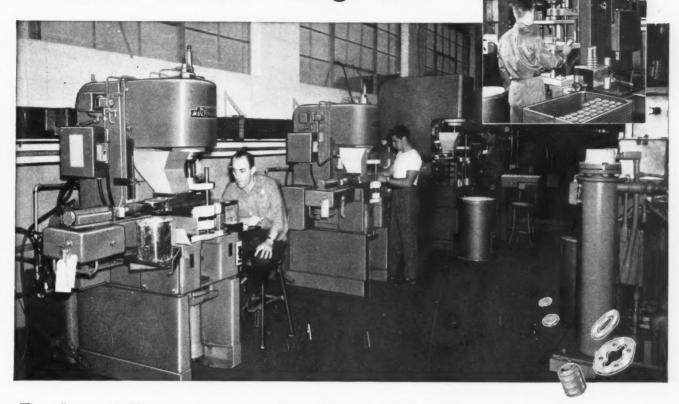


ATH CO. INCORPORATED

24 Grafton St., Worcester, Mass.

MULTIPRESS®

solves another "tough one"



Feeds and Forms hard-to-handle plastic with automatic accuracy

U. S. Gasket Co. gets quality plus speed in compacting parts from Du Pont's Teflon;

Toughness and high heat-resistance make Du Pont's Teflon an ideal plastic for many needs. But feeding the raw material to molding dies has been a problem; the granules tend to cling together in a nonfluid mass.

MULTIPRESS solved the feeding problem with its unique, shuttle-type, self-agitating feed attachment. In addition, the smooth, oil-hydraulic operation and fully adjustable ram action of Multipress brought other production gains. At cost-cutting production speeds, compacting is done with automatically uniform results—a necessity because most Teflon parts made at U. S. Gasket must pass micrometer tests for close-tolerance requirements.

Quick tool-changing and easy adjustment of ram stroke, speed and pressure are further advantages. With more than a thousand different dies, U. S. Gasket switches four Multipresses from one group of shortrun jobs to another with minimum loss of production time. Another feature this manufacturer likes is that Multipress provides a bottom ram to apply pressures upward giving equal pressures on top and bottom of parts. The four automatic Multipresses now in use at U. S. Gasket—a 25-ton, a 15-ton and two 8-ton units—are all equipped for this "double-end" ram action.

Multipress is getting better results for hundreds of manufacturers, in many different fields, because it provides smooth, rapid, low-impact pressures under accurate control—easily adjustable to the exact need. Eight frame sizes available . . . one-ton to 50-ton capacities . . . auxiliary equipment for many special needs. Write for full details.

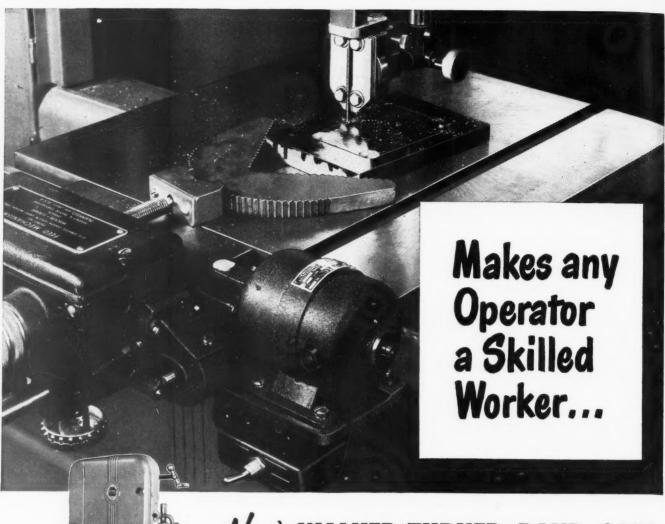


THE DENISON



ENGINEERING COMPANY

1152 Dublin Rd. Columbus 16, Ohio



WALKER-TURNER BAND SAW with Automatic Feed

Almost anyone who can throw a switch can do precision-cutting on this band saw. An Automatic Power Feed (one of the most effective methods of cutting metal ever developed) actually leaves little for the operator to do.

Motor driven and automatically controlled by the resistance encountered at the cutting edge, this revolutionary mechanism designed by Walker-Turner maintains a *pre-set* feeding pressure. No more costly blade failure and work stoppage. You *can't* overload a blade with Walker-Turner Power Feed!

Today, with production schedules stepped up and shortages of skilled labor rapidly developing, here's the machine for profitable operations. Cuts sheets, rods, and tubes of steel, iron, aluminum, brass, alloys and compositions, as well as molded plastics.

Ask your Walker-Turner distributor to show you the new Band Saw with Automatic Power Feed. Operate it yourself and see how Walker-Turner design can help you increase production and lower machining costs. Or write on your company letterhead for full information.

WALKER-TURNER

. DIVISION .

KEARNEY AND TRECKER CORPORATION PLANFIELD, N. J.

DRILL PRESSES . RADIAL DRILLS . TILTING ARBOR SAWS . BELT and DISC SURFACERS LATHES . METAL-CUTTING BAND SAWS . SPINDLE SHAPERS . JOINTERS

372—MACHINERY, August, 1952

SOLD ONLY THROUGH AUTHORIZED DEALERS

NATIONAL FORGING MACHINES For Deep-Piercing and Upsetting!



DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES-MAXIPRESSES-COLD HEADERS-AND BOLT, NUT, RIVET, AND WIRE NAIL MACHINERY Detroit

TIFFIN, OHIO.

les

led

the uts on,

osi-

tor

ith

ur-

ign

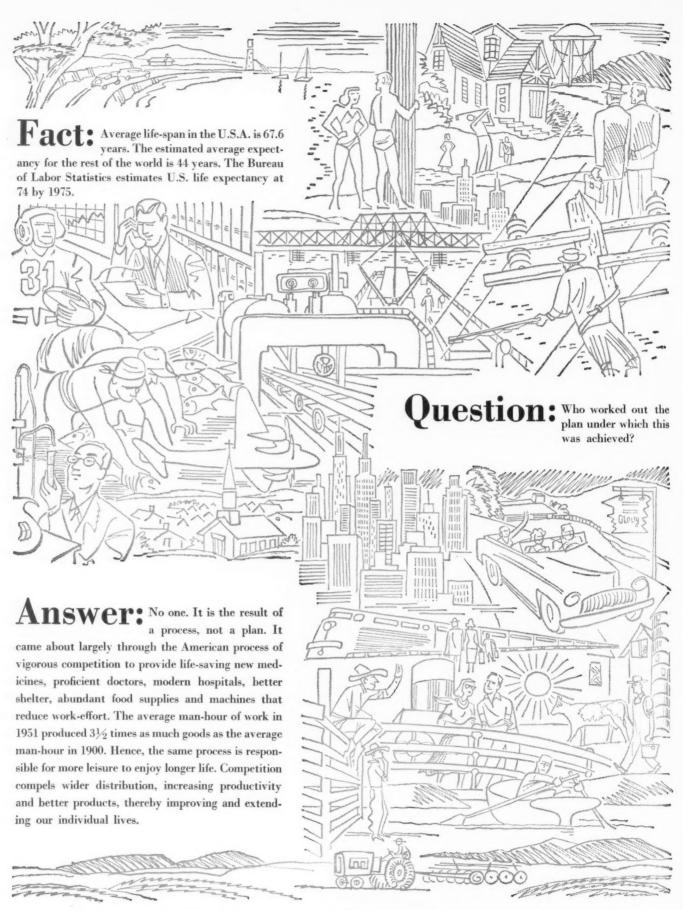
nd

our

on.

Hartford

National 9" Forging Machine



THIS REPORT ON PROGRESS-FOR-PEOPLE is published by this magazine in cooperation with National Business Publications, Inc., as a public service. This material may be used, with or without credit, in plant city advertisements, employee publications, house organs, speeches, or in any other manner.

THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE

Sprockets per day AIRCO FOUR-TORCH TRAVOGRAPH

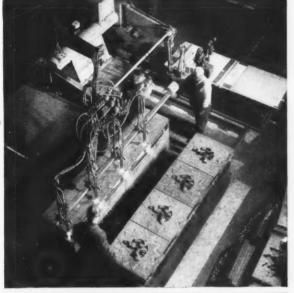
AIRCO FOUR-TORCH TRAVOGRAPH CUTS FINISHED SPROCKETS!

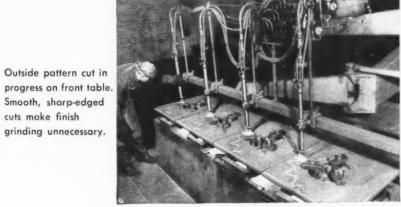
The No. 50 Travograph in action. Inner circle and straight line cuts are done on rear table. The Electronic Tracer guides the arm movements automatically by following a low-cost outline drawing.

the

his

.E





How to turn out tank sprockets to fit defense demands was quickly solved by the Otis Elevator Company. Installation of an electronically-guided Airco No. 50 Travograph Gas Cutting Machine in their Yonkers, New York plant was the answer.

Located next to the steel plate delivery entrance, Otis workers make quick work set-ups on their No. 50 Travograph, set a low-cost outline drawing under the Travograph's electronic tracer, and let the pantagraph arms guide the torches to work completion.

Torches are equipped with solenoid valves, operated by means of remote control switch which shuts gas off at work completion preventing contour-destroying notches . . . losing only torch gas — keeping hose lines full and instantly ready for next operation.

For your next production-run, largeparts job, where a machine-free finish is required on parts of any shape, it will pay you to consider the No. 50 Travograph. Whether you're cutting from plates, slabs, billets, or forgings, here is a precision machine that will cut identical parts on a profitable, quantity-production basis.

To obtain details about the Airco No. 50 Travograph for your operations, contact your nearest Airco office. Or just write and ask for Catalog 7, The No. 50 Travograph Gas Cutting Machine. Address: Advertising Department, 60 East 42nd Street, New York 17, New York.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND





DEALERS

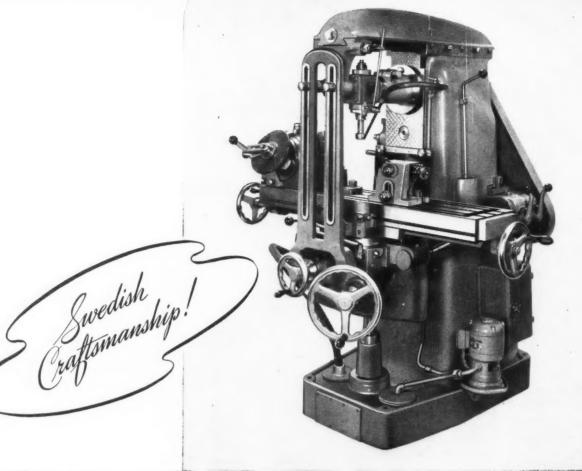
AND OFFICES IN

AIR REDUCTION

AIR REDUCTION SALES COMPANY . AIR REDUCTION MAGNOLIA COMPANY . AIR REDUCTION PACIFIC COMPANY

REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL

DIVISIONS OF AIR REDUCTION COMPANY, INCORPORATED





Sajo Vertical Milling Attachment

The Sajo "Plain" Milling Machine



exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standards of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cost.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U.S. inch system.

★ Standard Equipment includes: 3 HP motor and starter equipment, motor driven coolant system, adjustable table feed nut to allow climb-milling, 1" arbor, arbor support brace.

★ Extra Equipment: Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

CONDENSED SPECIFICATIONS

' x 914"
24%"
271/2"
814"
19"
40 RPM
12
40 NMT
3 HP

Precision anti-friction bearings on spindle and gear shafts

One-piece column and base

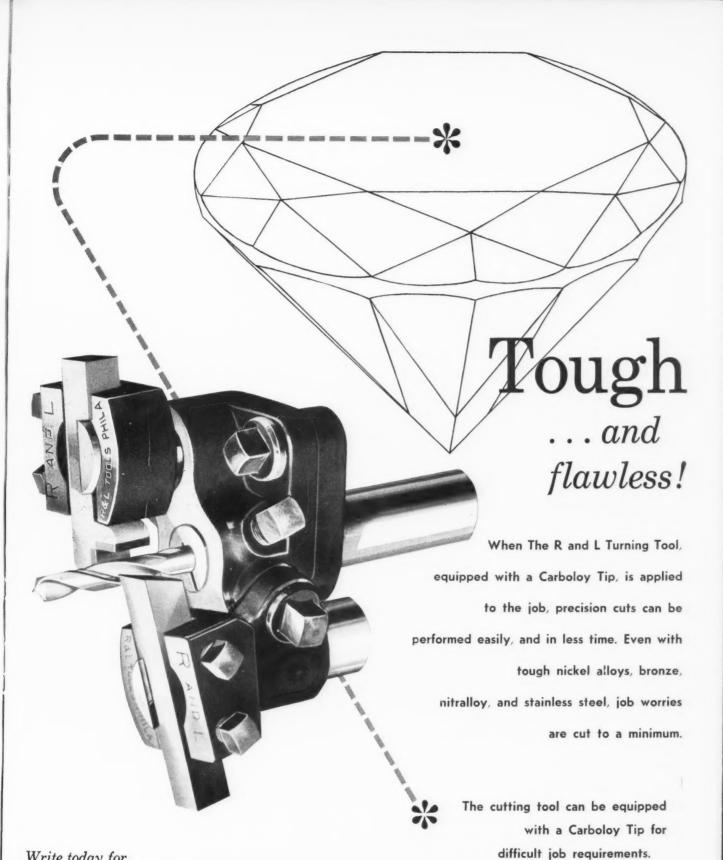
Net weight - 2200 lbs. Write for Catalog

--- PROMPT DELIVERY--ATTRACTIVE PRICE

AUSTIN INDUSTRIAL CORP. 76-E MAMARONECK AVE.

DEALERS IN PRINCIPAL CITIES

76-E MAMARONECK AVE.
WHITE PLAINS, N. Y.



Write today for
the complete
R and L Catalog

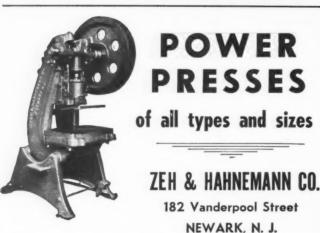
Æ.

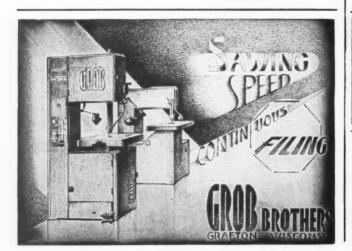


1825 BRISTOL STREET . PHILADELPHIA 40, PA.

TURNING TOOL • TAP AND DIE HOLDER • UNIVERSAL TOOL POST • TURRET BACKREST HOLDER • CUT-OFF BLADE HOLDER • RECESSING TOOL RELEASING ACORN DIE HOLDER • REVOLVING STOCK STOP • FLOATING DRILL HOLDER • KNURLING TOOL • CARBIDE AND ROLLER BACKRESTS









BUILD YOUR

For any rotary tool operation, build your own special production machines with Millholland Automatic Units. Built in a wide range of sizes, from 3/4 to 10 H.P., they give high flexibility and maximum cutting effi-ciency at low cost. Rugged spindle and bearing design prevents "whipping" and tool breakage under heavy loads. Write for complete engineering data, including electrical and air diagrams, gear ratios and 1/4-scale dimension drawings.

DELIVERY - 8 to 12 WEEKS

W. K. MILLHOLLAND MACHINERY CO., INC.

6402 Westfield Boulevard Indianapolis 20, Indiana

At right: Vee Belt Drive At top: Geared Drive





43 Standard Sizes

Forming for All Makes and Sizes of Press Brakes.



MANUFACTURING COMPANY

7412 S. Loomis Blvd., Chicago 36, Illinois





EISLER JIG BORING . CAMS

A SPECIALIZED CAM
MILLING SERVICE . . JIG BORING
SPOT WELDING . . CONTRACT
PRODUCTION . . EXPERIMENTAL
DEVELOPMENT

EISLER ENGINEERING CO., Inc. Chas. Eisler, Pres. 736 SO. 13th ST. NEWARK 3, N. J., U.S.A



TAPPING MACHINES

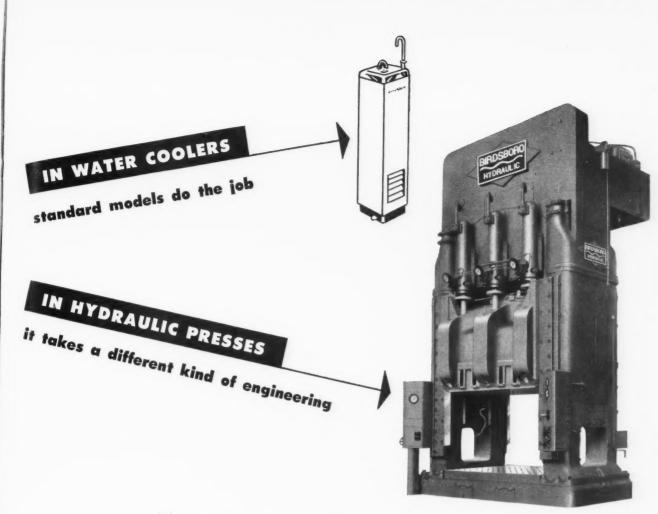
DUPLEX DRILLING MACHINES

FREW

CAM MILLING MACHINES HAND MILLING

> MACHINES SPECIAL MACHINES

THE FREW MACHINE CO. 121 E LURAY STREET . PHILADELPHIA 20 PA.



To give you the results you want from Hydraulic Presses . . . steady, high output and a new freedom from maintenance headaches . . . it takes a different kind of engineering. It takes engineering that keeps your requirements in mind from the very start of press design . . . through construction of components and assemblies . . . to skilled installation in your plant.

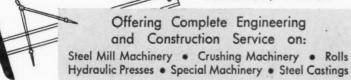
BIRDSBORO ENGINEERING SERVICE

If you feel (like many others) that this kind of engineering service can help to remedy production and profit ailments in your plant, we'd like to talk to you. There's no obligation. Birdsboro Engineering Service starts when and where you want it. First step is to contact Birdsboro's Engineering Department.

BIRDSBORO

STEEL FOUNDRY & MACHINE CO.

Birdsboro, Penna.



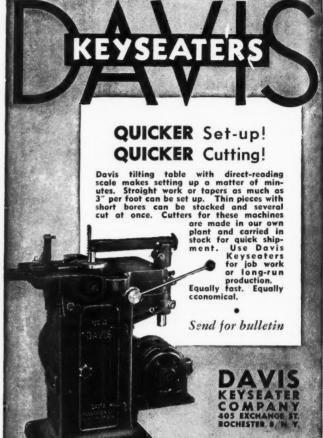


inches and 84 inches Capacity to 360

onger.

Accurate — High Production — Traveling Wheel Grinder Made by World's Largest Manufacturers of Shear Blade, Knife and Saw Grinding Machinery

Rapids - Michigan - U. S. A. Big 000 MANUFACTURING HANCHETT





The precision of a machine tool plus the durability of a workhorse. Complete with 1/2 H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

AND SIZES IN NEW MANUAL ON FINISHING WRITE TODAY

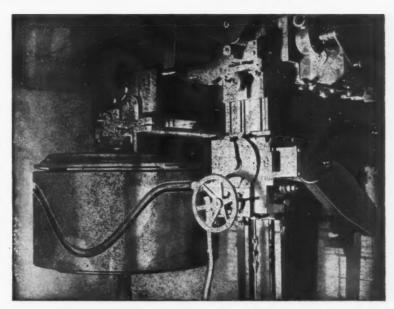
WALLS SALES CORP. 333 Nassau Avenue, Brooklyn 22, N. Y



* Rowbottom/& Cams

Save Valuable **Production Time!**

Don't waste time! Don't tie up valuable production machines! Use Rowbottom specialist service whenever you need cams. We have the experience and the equipment to produce cams of any size or shape, in any material, for any application. Call on Rowbottom whether you need one big cam such as the one illustrated or a thousand or more smaller ones.



ROWBOTTOM THE MACHINE COMPANY WATERBURY, CONN., U. S. A.

PERFECT ALIGNMENT Every Time with ROOFE Heavy-Duty **BULL NOSE CENTERS**

• Two double rows of quality bearings in the large and small ends of the nose of this live center are your assurance of perfect alignment on any type of work.

ER tool Duty

ension

e, etc.

Two shank sizes provide diameters from 1/2" to 71/2" for a wide range of work with a single center.



Write now for complete catalog of all types of ROOFE Live Centers

HOUSTON **GRINDING & MFG. CO., INC.**

2110 QUITMAN STREET • HOUSTON 10, TEXAS
Reliable Distributors Wanted

your best buy in modern milling machines:



Plain or Universal

• Offers every modern milling machine advantage:

18 spindle speeds 25 to 1250 rpm, 18 feeds 14" to 30" per minute, rapid traverse, Timken bearings and many others.

You can't buy a better combination of simplicity, rugged construction, ease of operation, accuracy and production speed.

Send for bulletin and price list.

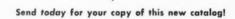


THE GREAVES MACHINE TOOL CO. 2500 Eastern Avenue, Cincinnati 2, Ohio Read all about this ABR.

Surface Grinder!

Here's a brand new catalog — packed with facts and figures about the 1218 Hydrabrasive Surface Grinder. If you're concerned with getting better output and improved quality in your surface grinding operations, you'll find this new hydraulically operated surface grinder fits right into your plans. The 1218 Hydrabrasive, because of its wide cross travel (12") and moderate table length (18"), takes the load off your heavy grinders on many classes of work.

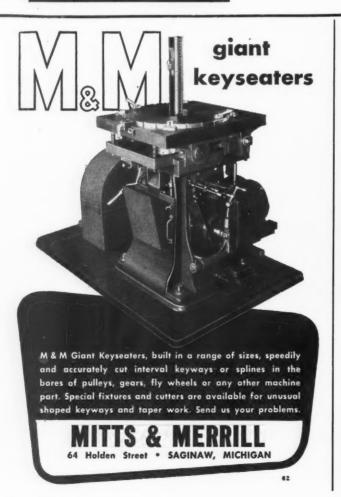
ABRASIVE MACHINE TOOL COMPANY
12 DUNELLEN ROAD, EAST PROVIDENCE 14, R. I.



Abrasive Quality is Reflected in the Finish of Your Product

BEASIVE MACHINE TOOL COMPANY - LAST PROVIDENCE 14, PRODE

ABRASIVE
ACCURACY BOOSTS TRODUCTION





When job specifications leave no leeway, when extreme tolerances must be rigidly maintained... that's when the built-in precision of Grand Rapids Grinders proves most valuable.

Defense commitments are delaying rapid fulfillment of your orders . . . but as always we're doing our best to serve you.

GALLMEYER & LIVINGSTON CO. 305 Straight Ave. • Grand Rapids, Mich.



GRAND RAPIDS GRINDERS

... the very best

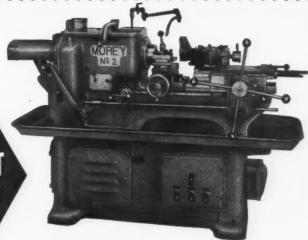
Manufacturers of Surface Grinders • Cutter and Tool Grinders • Tap and Drill Grinders

For Ease, Economy and Simplicity of Operation

DEPEND ON THE

Designed to take full advantage of tungsten carbide tools, the modern MOREY Turret Lathes are ruggedly and heavily built for continuous duty, maintaining close tolerances. New methods of speed and feed control are incorporated, permitting even the inexperienced operator to select almost instantaneously the speed and feed best suited to the work ... Ideal for both bar and chucking operations.

No. 2 TURRET LATHE



STOCK DELIVERY WITH PRIORITY!

PARTIAL LISTING OF SPECIFICATIONS:

Bar work capacity	1" dia. x 6"
Chucking capacity	
Swing over bed	14"
Hole through spindle	1-9/32"
Spindle speeds (Back gear ra	atio): 60-2000 RPM Inf.
variations with constant s	speed, AC 1800 RPM
motor 1:5.8	
Motor	3 HP

You need the MOREY for your production! Write us today for complete details.

MUREY MACHINERY CO., INC.

Manufacturers • Merchants • Distributors 410 BROOME STREET . NEW YORK 13, NEW YORK TELEPHONE: CANAL 6-7400 . CABLE ADDRESS: WOODWORK, N. Y.



TWO - WAY STREET

Since we started making all types of gears nearly 50 years ago, our customers have told us they like what we give them.

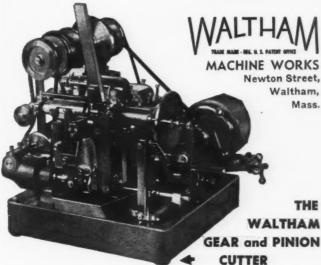
Now this sort of thing is a two-way street. By lowering gear cost or increasing machine efficiency for our customers we give them that extra dividend so usable for something else. For our part, we feel that increasing repeat business is pretty conclusive proof of our ability fo give the type of service we want to give. THE EARLE GEAR & MACHINE Co., 4707 Stenton Ave., Philadelphia 44. Pa.

it's good business to do business with EARLE .

SMALL GEAR AND PINION PRODUCTION THAT'S

Automatic!

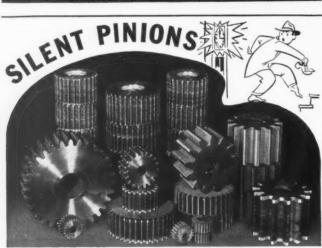
Automatic loading and unloading feature elimingtes lost motion in producing accurate small diameter, fine pitch gears and pinions on the Waltham. Individual motor drive through step cone pulleys gives a wide range of feeds and speeds. Compact design takes up less than 4 sq. ft. on the bench. If you want accurate . . . fast . . . economical small gear production, get full information.



THE WALTHAM **GEAR** and PINION

Mass.





When your needs call for silent gears and pinions, get them from Stahl. Whether fabroil, bakelite or rawhide, Stahl'has the experience and specialized equipment to make them right, in any size or any quantity. For prompt delivery and attractive quotations, get a Stahl estimate first.

Stahl

BEVELS TO 54" PD, 1 DP
SPIRAL, HELICAL and WORM GEARS
TO 48" PD, 2 DP
CONTINUOUS-TOOTH HERRINGBONE
TO 60" PD, 2 DP
SPROCKETS TO 72" PD, 21/2" CP
RACKS TO 20 FT. LONG, 3 DP
SILENT GEARS;
RAWHIDE, BAKELITE, FABROIL
HEAT-TREATED, CASE OR FLAME
HARDENED GEARS —
OF CARBON OR ALLOY STEEL

SPURS TO 72" PD, 1 DP

GEAR & MACHINE COMPANY 3901 Hamilton Ave. Cleveland 14, Ohio



PRODUCT PLANNING.

There are indications that manufacturers again will be creating more and better products—machinery, gadgets, equipment for consumer and industry uses.

Wherever gears are involved, let Diefendorf help with the design and planning. All types, materials and sizes. Contract production from specifications only.

DIEFENDORF GEAR CORPORATION

Syracuse 1, New York

DIEFENDORF G E A R S



CALL WILLIAMSON FOR FAR

REGENT 9-8424

HOBBING . . . SHAPING LAPPING . . . SHAVING GENERATING—ALL TYPES

WILLIAMSON GEAR & MACHINE CO.
2606 MARTHA STREET PHILADELPHIA 25, PA.

GEARS - ALL MAKES . . . Special and Standard

PRECISION GEARS UP TO 200 DIAMETRAL PITCH
All Gears certified for Accuracy
Quality and Fine Workmanship

NEW JERSEY GEAR & MFG. CO. 1470 Chestnut Ave. Hillside, N. J. Look for ...



rers ating prod-

conuses, are

dorf esign ypes, Confrom

EAR

York

0.

rd

MACHINE TOOLS

2 EUROPEAN EXHIBITION
HANOVER
WESTERN GERMANY

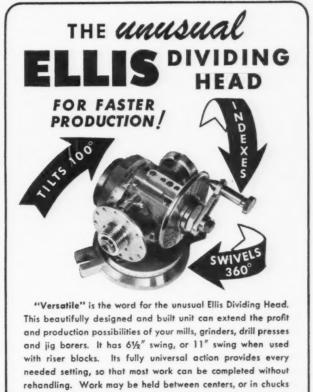
SEPTEMBER 14th to 23rd, 1952

for information apply to:

UCIMU

MAKERS' ASSOCIATION
4. VIA G. GIARDINO • TEL. 896212





or collets. Write for catalog giving complete details!

NICHOLS-MORRIS CORPORAT

76-E MAMARONECK AVE., WHITE PLAINS, N. Y.

NEW GAGING PROBLEMS?

- New, semi-trained help.
- Rush schedules.
- Govt. spex and inspectors.
- Statistical Quality Control.
 - Change-over to new items.

TRY NEW GAGING APPROACH

COMTORPLUG

PATENTED EXPANDING INTERNAL COMPARATOR

gages bores to fractions of .0001"



- at machines
- at inspection bench
- for selective assembly

Comtorplug takes the variable human element out of internal gaging, gives you positive fixed — not passing — reading of actual size. Shows diameter of any part of a hole, right to bottom, detects tapers, out-of-round, bell-mouth, showing exact amount of variation. New help use it with complete accuracy. Precise yet rugged. Machine operators get much higher percentage of acceptable work. Ideal for Statistical Quality Control because shows actual size of



For holes 1/8" to 8"

All Plugs interchangeable in Amplifier.





Machine operator can gage work right in chuck with 100% accuracy.

Inspecting highly critical hydramatic propeller hub distributor valve.

For the complete story

REQUEST BULLETIN 40



COMTOR CO.

74 FARWELL STREET WALTHAM 54, MASS.

Also makers of "Comtorgage"

Precision External Comparator

APEX TOOLS

INSERTED-BLADE MILLING CUTTERS
AND SINGLE-POINT TOOLS FOR
ALL METAL-CUTTING NEEDS



APEX TOOL BITS FIT MOST STAND-ARD HOLDERS



If you haven't yet changed to Apex, you can begin to get acquainted by using Apex Bits in your present holders. The Apex line includes Single-Point Round Shank (as shown) and Shankless Serrated — plus Inserted-Blade Milling Cutters of all different styles. Write for catalog.



PROMPT SHIPMENT FROM OUR LARGE, COMPLETE STOCK

APEX TOOL & CUTTER CO., Inc., Shelton 11, Conn.

HARDNESS TESTING

Brinell—Shore—Scale

Included in our improved Portable Scleroscope Model D-1. This efficient single scale tester registers Brinell-Shore values without damage to the work. The old standby for forty-three years,

WRITE FOR CIRCULAR

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.

90-35 Van Wyck Expressway, Jamaica, 35, N.Y.



IMPROVE FACING OPERATIONS

M-D Facing Head feeds automatically. Lathe tool bit travels radially, from center outward or reverse. 10 sizes 6" to 46" dia. Write for Bulletin, Prices.

On Boring Mills. Drills. Lathes. Millers and Radials

MUMMERT-DIXON COMPANY, HANOVER, PA.





providing means for indisputable control of all precision work.

THICKNESS, DIAMETERS, LENGTHS, PROFILE, SHAPE AND FINISH - Simple in construction, reasonable in price, and fully reliable for unerring accuracy and wherever possible independent of the human element of "feel".

SAFEGUARD YOUR PRODUCTION

WRITE FOR DETAILS TO ... GEORGE SCHERR CO., Inc. COMPLETE LINE OF PRECISION INSTRUMENTS 202 LAFAYETTE ST.• NEW YORK 12, N.Y.

Screw Machine Products from Brass, Aluminum, and Stainless Steel



NT

GE,

CK

ble ent

ell-

the

New, modern machinery, complete manufacturing facilities. Forward your specifications and prints for prompt estimates.

MARYLAND PRECISION INSTRUMENT CO.

12 E. Lanvale St. • MUlberry 4789 • Baltimore 2, Md.

Complete Manufacturing Facilities 20 Years' Production Know-How

POWER FEED FOR FACING A BORING HEAD THAT WON'T FACE NEW IS NOT -Designed COMPLETE Added Features Boring, Facing, Turning Grooving, Undercutting — All in ONE Toolhead WRITE FOR DETAILS CHANDLER TOOL COMPANY, Muncie, Ind. FACING TOOL HEADS

Pittsburgh Brushes Solved these Problems!



L CLEANING RED-HOT CASTINGS in 30 seconds!

> A Pittsburgh brush answered U. S. Pipe and Foundry's prob-lem of cleaning red-hot cast-ings. This rugged brush works 40 hours a week, turning out thoroughly cleaned castings at the rate of one every 30 seconds . . . a speed record for any brush cleaning operation of this type.

2 POLISHING 10,000 heating units!

When the Edwin L. Wiegand Company wanted to remove ragged edges from their Chromalox Heating Units economically and fast, they turned to rough, tough Pittsburgh Brushes for the answer. The 6" Pittsburgh steel wire brushes they installed polish 10,000 heating units during their life.



CLEANING WELDS in close quarters!



Allis-Chalmers' problem was to find a brush narrow enough to fit between cooling fins of transformer radiators, yet strong enough to remove slag and spall on welds which could conceal pressure-reducing pinholes. Pittsburgh engineers recom-mended an 8" rotary wire brush. Problem was solved!

Let Pittsburgh Engineers Solve Your Brush Problems.

Pittsburgh's complete line of brushes of every type, for every purpose, will provide a practical and economical solution of any brush problem you might have. Drop us a line on your company letterhead for a copy of our new booklet that shows, through actual case histories, how

Pittsburgh can help cut your brushing operation costs. Address: PITTSBURGH PLATE GLASS COMPANY, Brush Div., Dept. W-9, 3221 Frederick Ave., Baltimore 29, Maryland.



BRUSHES . PAINTS . GLASS . CHEMICALS . PLASTICS

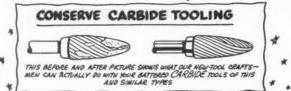
PITTSBURGH PLATE GLASS COMPANY

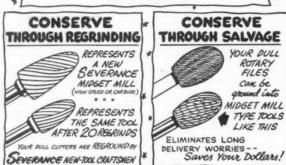
Severance Regrinding Service

RECONDITIONING TO NEW-TOOL PERFORMANCE AT A FRACTION OF NEW TOOL COST!

☆ HIGH SPEED and CARBIDE ☆

Why take less ? -- for Safety, Efficiency, Economy -insist on genuine factory reconditioning service performed by Severance New Tool Craftsmen!





* * * . Were the Originators OVER 20 YEARS EXPERIENCE IN THIS MONEY SAVING SERVICE

* We've been copied but not surpassed * DEPENDABLE DELIVERIES ARE ASSURED * THROUGH SEVERANCE REGRINDING SERVICE We Regrand: MIDGET MILLS, ROTARY FILES, BURS, FILE BANDS, COUNTERBORES, COUNTERSIAKS, ETC.

SEND YOUR Severance Tool Industries Inc. 1000 Ave.

SAGINAW, MICHIGAN In Canada: 60 FRONT STREET WEST, TORONTO





TIPPED . . . Work Support Blades



Standard thrufeed and infeed work support blades available from stock. Prices on special blades quoted on receipt of prints. Worn blades salvaged — retipped and reground.

Send prints for prompt quotes on special tools.

WRITE FOR CATALOG

WILLEY'S CARBIDE TOOL CO.

1342 W. Vernor Highway

Detroit 1, Michigan





• Cap and Set Screws

Nuts • Taper Pins • Stud:

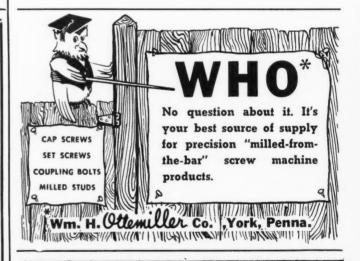


Chicago SCREW COMPANY 2807 WASHINGTON BLVD. BELLWOOD, ILL.

A

B

B



LUERS

PATENTED CUTTING OFF TOOL HOLDERS PATENTED CUTTING OFF BLADES

ONLY the PATENTED construction of LUERS cutting of BLADES permits normal expansion of bursting chips — MEANS MAXIMUM ONLY the parties of t

J. MILTON LUERS, 12 Pine Street, Mt. Clemens, Mich.

COMMERCIAL TOOL HARDENING AND HEAT TREATING

Strictly Modern Equipment, Backed by the Skill and Judgment of 40 Years' Experience. Also, We Sell "Heat-Easy" Compound for Pack Hardening High Speed and High Carbon—High Chrome Steels.

THE BENNETT METAL TREATING COMPANY, Elmwood, Conn.

In IDLE man at a BUSY

automatic spells profits a BUSY man at an I machine spells LOSS

H & G INSERT CHASER DIE HEADS ARE PREFERRED BY SCREW MACHINE ENGINEERS BECAUSE THEY SPELL . . . LESS DOWNTIME . . .

THE EASTERN MACHINE SCREW CORPORATION 23-43 Barclay Street, New Haven, Conn.





2829 1stn AVE. S., MINNEAPOLIS 7, MINN.









Universal Joint Drillhead . . . Full Ball or Bronze Bearing Construction. Standard and Heavy Duty. From $\frac{1}{2}$ " Minimum Centers up. Capacities to 1" in Steel.

Gear Driven Eccentric Type Adjustable Drillhead . . . Enclosed, Full Ball Bear-ing Construction.

Special Fixed Center Drillhead . . . Full Ball Bearing Construction.

- We Stock or Can Build the Right Drillhead for Your Job.
- Write for THRIFTMASTER Complete Catalog or phone for a rush, on-the-spot, quote.



Subsidiary of Thomson Industries, Inc.

HRIFTMASTER Products Corporation

1076 N. PLUM STREET LANCASTER, PENNA. Also Makers of DORMAN AUTOMATIC REVERSE TAPPERS

MACHINERY, August, 1952-389





and TOMORROW RUTHMAN

Pioneers in the development of a practical machine-tool coolant pump, Ruthman has consistently offered you a better pump for your machines.

Totally enclosed drip-proof motors . . . heavy-duty pre-lubricated ball-bearings electronically balanced rotating assembly, are a few of the many innovations Ruthman has introduced over the years. For the best coolant pump specify Ruthman.

Write for catalog today.

MACHINERY CO.

1807 Reading Road

Cincinnati 2. Ohio

WHAT VIKING



A partial view of moulds being Viking's bronze and aluminum

A pump can be no better than the material that goes into it.

All Viking pumps are made from castings poured in our own rigidly controlled Sorbo-Mat foundries.

When you buy a Viking pump, you are assured of the finest gray iron and non-ferrous parts available for the application.

This is just one of the reasons you can expect better and longer service from Vikings-the original gear-within-a-gear pump
—the design that made rotary IKING

pumps famous. HONORED NAME Send for folder 1100J today.



PUMP COMPANY Ceda: Falls, Iowa



Just because that bathing suit is proper at the beach, she shouldn't assume it's proper for the classroom, too!

And just because one bearing is best lubricated by one particular grade of oil, you shouldn't assume that the same oil is best for all bearings on that machine. In many cases it isn't.

OIL CUPS permit you to lubricate each bearing with the oil best suited to that bearing-thus prolonging bearing life, reducing maintenance costs, cutting down-time, boosting production. And oil cups fortunately cost very little.

Gits oil cups have been the standard for industry for more than 40 years. Gits Bros. has the largest selection of oil cups available anywhere. Call on Gits Bros. for a prompt, efficient solution to your lubrication problems.

> Write for free Catalog No. 60-A

GITS BROS. MFG. CO.

1858 S. Kilbourn Ave. Chicago 23, Illinois

Classified and Re-Sale Section

GOOD TOOLS

AUTOMATIC. 1 1/4 " Conomatic 8 spindle, AUTOMATIC. 7" Baird 6 spindle chucker. MULTAUMATIC. 8" Bullard 6 station. BORING MILL. 61" Bullard Maximill. BROACH. 12 ton 32" stroke Lapointo, BROACH. 18 ton 42" stroke American, DRILL, RADIAL. 3 1/2 1, 8" American. GEAR HOBBER. 72" Schuchardt & Schutte. GEAR HOBBERS. No. 12 Barber-Colman. GRINDER. 10" x18" Norton semi-auto. GRINDER. No. 1/2 G. & L. tool and cutter. GRINDER. 12", No. 22 Heald rotary. GRINDER. No. 72A3 Heald gagematic. GRINDER. No. 5, 16-28 and 24-36 Bryant. GRINDER. No. 2 Cincinnati, centerless. HAMMER. No. 5 N. & 6B Nazel Air. HONE. No. H2 Micromatic. HAMMER. No. 2 Gincinnati, centeriess. HAMMER. No. 5 N. & 6B Nazel Air. HONE. No. H2 Micromatic. HONE. Nos. 172 and 2610 Barnes, KEYSEATER. Nos. 3 and 4 Mitts & Merrill. LATHE. 24"x14' American G.H. LATHE. TURRET. No. 5 Acme univ. MILLER. No. 33 Kempsmith Mfg. MILLER. 80"x36"x12' Ingersoll, adj. rail. MILLER. 30", 42", and 84" Ingersoll rotary. MILLER. 8"x16" Hanson-Whitney thread. MILLER. 8"x16" Hanson-Whitney thread. MILLER. Nos. 4, 6 and CT36 Lees-Bradner. PLANER. 48"x48"x12' Gray, 4 head. PRESS. 60, No. 94E Toledo. PRESS. 600 ton, No. 570 Toledo forging. PRESS. 650 ton, No. 8411 Hamilton toggle. SHAPER. 24" Stockbridge. THREAD ROLLER. 9/16" National. UPSETTER. 3" National, air clutch. UPSETTER. 3" National, air clutch. UPSETTER. 4" Aiax.

MILES MACHINERY COMPANY

Box 770 SAGINAW, MICHIGAN

16" CHUCKER DESIGN

Most modern vertical design hydraulically operated chucking machine on American market with 16 inch capac-ity, hexagon turret, 2 independent side heads, geared drive with easily applied electronic speed control drive possibilities. Unit design permits larger sizes and two spindle applica-tions, side heads can be adapted for contour turning or facing, and other patented and exclusive features

Machine design requires more capital, manufacturing facilities, and sales group than present owner can provide.

Drawings, patents, patterns, and available machines together with good-will and experience complete profitable package deal for right group. Will deal only with principals. Box No. 617, MACHINERY, 148 Lafayette Street, New York 13, N. Y.

Castern Rebuilt Machine Tools

THE SIGN OF QUALITY -THE MARK OF DEPENDABILITY

TOOL AND CUTTER GRINDERS

No. 2B Sollers, m.d.
No. 2 Lumsden Oscillating Tool Grinder,
belted m.d.
No. 4T Sellers Tool, m.d., latest
No. 1 J & B Tap Grinder, m.d.
Pratt & Whitney Deep Hole Drill Sharpener,
m.d.
Gould & Eberhardt Gear Cutter Grinder,
2 step cone pulley belt-drive
Sellers Wet Drill Grinder, m.d.
Gisholt Universal Tool Grinder, belt
No. 51 Oliver Motor Driven Drill Pointer

3400 lb. Niles Steam Hammer No. 4B Nazel Air Hammer, m.d., with compressor built-in 6000 lb. Niles Hammer

ENGINE LATHES

9x24" Hendey Tool & Gaugemaker's, m.d. 12x24" LeBlond Regal Geared Head, m.d. 12x30" centers Monarch Geared Head, m.d. 12x6' Lodge & Shipley Geared Head, m.d.,

centers Pratt & Whitney Model B, m.d., taper 14"x25" Gap x 8' between centers LeBlond,

m.d., taper

""x25" Gap x 8' between centers LeBlond,
m.d.
14"x6' bed Hendey Geared Head, m.d., taper
14"x6' Lodge & Shipley Geared Head, m.d.
14"x6' Pratt & Whitney, cone
14"x6' Sidney Geared Head, m.d.
14"x6' Springfield Geared Head, m.d., taper
14"x8' Sidney Geared Head, m.d., taper
14"x8' Sidney Geared Head, m.d., taper
14"x8' Sidney Geared Head, m.d.
16"x6' Hendey Geared Head, m.d.
16"x6' Hendey Geared Head, m.d.
16"x6' Hendey Yoke Head, taper
16"x6' Hendey Yoke Head, taper
16"x6' Lodge & Shipley, cone
16"x6' bed Monarch Geared Head, m.d.
16"x84" Pratt & Whitney Type B, m.d.
16"x88 Monarch, cone, motorized
17"x6' LeBlond Geared Head, m.d.
18"x6' bed Lodge & Shipley, cone, motorized
18"x6' Greaves-Klusman Geared Head, m.d.
18"x6' Greaves-Klusman Geared Head, m.d.
18"x6' Greaves-Klusman Geared Head, m.d.
18"x7' Hendey Geared Head, m.d., taper

18"x6'6" Greaves-Klusman Geared Head, m.d., in leg 18"x7' Hendey Geared Head, m.d., taper 18"x8' Hendey Geared Head, m.d. 18"x8' Lodge & Shipley Selec. Head, m.d. 18"x8' Champion, cone 18"x8' Whitcomb-Blaisdell Geared Head 18"x10' Boye & Emmes, m.d. 18"x10' Springfield Geared Head, m.d., taper 18"x20' Monarch Geared Head, m.d., in leg 19"x6' centers LeBlond Geared Head, m.d., taper, late 20"x3' bed American Geared Head, m.d., taper 20"x8' Cisco, cone

20"x8' bed Greaves-Klusman Geared Head, m.d. in leg 20"x10' Lodge & Shipley Geared Head, m.d. 20"x10' Sidney Geared Head, m.d. 21"x10' LeBlond Geared Head, m.d. 22"x8' Lodge & Shipley, cone 33"x12' LeBlond Geared Head, m.d., taper 23"x12' LeBlond, cone, motorized 23"x14' bed LeBlond Geared Head, m.d., taper 24"x9' bed Lehmann, cone, motorized 24"x10' Lodge & Shipley Geared Head, m.d., taper taper

24"x19' bed Lehmann, cone, motorizea
24"x10' Lodge & Shipley Geared Head, m.d.,
taper
24"x10' American, cone
24"x12' bed Boye & Emmes, belt drive
24"x12' bed Boye & Emmes, belt drive
24"x12' bed Boye & Emmes, belt drive
24"x12' bed Lehmann Geared Head, m.d., taper
24"x13' bed Lehmann Geared Head, m.d., taper
24"x16' Cisco, cone, motorized
24"x24' bed Lodge & Shipley Geared Head,
m.d., taper
24"x30' bed American Geared Head, m.d.,
taper, late
25"x10' LeBlond, cone
25"x60' x8' centers LeBlond Gap Lathe, m.d.
26"x8' Bridgeford Geared Head, m.d.,
30"x12'6" Niles-Bement-Pond, m.d., taper
30"x13'6" bed Niles-Bement-Pond, m.d.
30"x16' bed Lodge & Shipley Geared Head,
m.d., taper
30" American, raised to swing 44", 15' bed,
m.d.
25"x16' had LeBlond Geared Head, m.d.

m.d. 36"x16' bed LeBlond Geared Head, m.d. 36"x38' American Triple Geared Internal Face Plate Drive, m.d., taper 42" American (raised to swing 54") x 17' bed,

m.d.
42" Putnam (raised to swing 56½") x 20' bed
Geared Head, m.d., 11'8" centers
44" swing x 15' bed American, m.d.

MANUFACTURING LATHES

MANUFACTURING LATHES

No. 3 Lodge & Shipley Duomatic, m.d.
Model Bl.—¾ H.P. Blount Speed Lathe, m.d.
W. C. Lipe Carbomatic Lathe, m.d.
Colborne Mfg. Bench Type Speed Lathe, m.d.
No. 4 LeBlond Boring Lathe, 37' bed, 13" hole
No. 9, 12 LeBlond Multi-Cut, m.d.
3½x36", 3½x80", 4x60", 8x44" LoSwing, m.d.
8x132" LoSwing, m.d., latest
9x12" Sundstrand, s.p.d.
11x18" LeBlond Rapid Production, m.d.
12x18" centers Monarch Model 5T, m.d.
17"x6' LeBlond Automobile Mfg., cone
17"x8' LeBlond Automobile Mfg., cone
20"x8' LeBlond Mig., m.d.
21"x8' LeBlond Turret Lathe, cone
Schauer Type NA2B Speed Lathe, m.d.

HONING MACHINES

H1 Micromatic Horizontal Hydrohoner, m.d. H4 Micromatic Horizontal Hydrohoner, m.d. No. 6 Barnes Twin Spindle Honing Machine, m.d.

We carry an average stock of 2,000 machines. Let us quote on your requirements.

MACHINERY EASTERN COMPANY

1006 Tennessee Avenue, Cincinnati 29, Ohio · MElrose 1241 · Coble Address EMCO

REBUILT AND NEW

GUARANTEED MOTORS M.G. SETS . GENERATORS

Hoists . Compressors . Transformers Units of Every Size and Description WE'LL SELL, BUY OR TRADE



CHICAGO Electric Co.

1337 W. CERMAK ROAD CHICAGO 8, ILL.

FOR SALE

New Inclinable Presses For Metal Stamping

American Can Company offers for sale a number of new inclinable presses for metal stamping. Canco's own make, ranging from 11- to 46ton capacity.

Inquire of:

AMERICAN CAN COMPANY

Equipment Division 100 Park Avenue, N. Y. 17, N. Y. WE BUY - SELL OR TRADE ALL TYPES OF LATE MODEL

MACHINE TOOLS

WRITE FOR YOUR FREE COPY THIS MONTH'S LINCOLN LOG FOR CURRENT LISTINGS



Lincoln MACHINERY SALES CORP 438 N. LARAMIE AVE. CHICAGO 44, ILL

WRITE TODAY

MACHINERY, August, 1952—391

Classified and Re-Sale Section

For Greater Machine Tool Values buy Botwinik!

SPECIAL

Bertsch 1 ½ " x 18' Pyramid Type Bending
Roll—Drop End Type—100 HP main drive
and 50 HP adjusting motor—1944 machine
—Used very little

BORING MILLS-HORIZONTAL

BORING MILLS—HORIZONTAL
Fosdick No. 0—3 1/8" bar—Outboard support—
V-belt MD
Landis No. 40—4" bar—Floor type—Outboard support—54" vertical traverse—MD
Detrick & Harvey No. 2—5" bar—Floor type
—Outboard support—Universal table—60"
vertical traverse—MD

vertical traverse—MD

BORING MILLS—VERTICAL

Bullard 42" and 54" Spiral Drive—Side heads

4-jaw chuck tables—MD

Niles 38"/44" with Side Head—3-jaw chuck
table—Threading attachment—MD

Betts 8"—Table 98" dia.—Swing 108"—
2 swivel heads—69" under cross rail—MD

Cincinnait 10'—Massive Type—Swing 124"—
2 swivel heads—MD

2 swivel heads—MD

DRILLS—RADIAL

Fosdick 5'14"—Box Table—Tumbler gear box
—MD
Cinchnati-Bickford 7'22" Master Type—Box
table—24 speed head—MD

MISCELLANEOUS

Bullard 30" x 20" Man-Au-Trol Spacer Unit
—Hydraulically operated—Adaptor plate—
Stop rods—Measuring tools—Late type—
Excellent condition

Hydraulicans
Stop rods—Measuring tools—Law
Excellent condition
nompson-Gibb Universal Seam Welder—Arm
nompson-Gibb Universal Seam Welder—Arm
55" iong—Handles rolls 6" dia., and larger Excellent consultations of our huge

Excellent controls

Thompson-Gibb Universal Seam
55" long—Handles rolls 6" dia., and mass.

—Complete controls

Van Norman No. 22LU Universal Miller—Tbl
wkg surface 45" x 11 %"—Range 27 ½" x
11" x 17 ½"—MD—Late type
National 3" Upsetter—Stroke of headers 12"—
Die space 17 ½" x 20"—Work conveyor—
MD

This is only a partial



This is only a partial listing of our huge stock of Machine Tools of every make and description.

Send for our free catalog "The Plant That Answers 1001 Machine Tool Problems.'

14 SHERMAN ST., WORCESTER, MASS.

WANTED

ASSISTANT CHIEF ENGINEER and PRODUCTION ENGINEER

Internationally known machinery manufacturer requires services of following:

Experienced Engineer for supervising design and development of Machine Tools, Hydraulic Plastic Machinery.

Experienced Engineer for Production Control Supervision, especially inventory control.

Employ 800 to 850, company paid retirement, 6 holidays and vacation. Liberal bonus plan based on profits. Group insurance and other benefits.

Box No. 628, MACHINERY, 148 Lafayette St., New York 13, N. Y.

PROCESS ENGINEERS TOOL DESIGNERS **OPERATION SHEET** WRITERS TOOL TROUBLE MEN FAIRCHILD

ENGINE DIVISION of the
FAIRCHILD ENGINE & AIRPLANE CORP.
New Highway, Formingdale,
New York

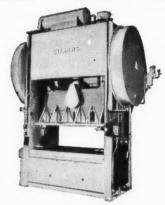
MACHINE TOOLS

Sundstrand Model 30H Horizontal Hydraulic Two Spindle "Rigidmil" Production Machine 1000 MACHINE TOOLS "IN STOCK"

FALK MACHINERY CO. 18 Word Street-BA 5887-Rochester, N. Y.

WORLD'S LARGEST STOCK STAMPING PRESSES

BLISS . CLEARING . CLEVELAND FERRACUTE • HAMILTON • L & J NIAGARA • TOLEDO • V & O



SQUARING SHEARS . PRESS BRAKES REBUILT and GUARANTEED

JOSEPH HYMAN & SONS

TIOGA, LIVINGSTON & ALMOND STS. PHILADELPHIA 34, PA. Phone REGENT 9-7727

CAN MANUFACTURING MASTER MECHANIC

Must have practical experience on high speed automatic can-making equipment and ability to supervise maintenance machine shop that services presses, tools, dies, and can-making equipment. Give full details in first letter. Salary open. Location—Metropolitan New York. Box No. 629, MACHINERY, 148 Lafayette Street, New York 13, N. Y.

SURPLUS DISPOSAL

-Fellows No. 75 Gear Shapers— Serial No. 11098 and No. 13153 -No. 12 Gleason Bevel Generator-

Serial No. 15458

Gould & Eberhardt Bevel Rougher

36B—No. 2901 Brown & Sharpe No. 4-48 Gear Cutter Serial 595

Lees-Bradner No. 5 AC Hobbing Machine No. 984

-Reinecker Universal Hobbing Ma-chine Tangential 60" Diameter -Fitchburg Automatic Plunge Cut

and Horizontal Grinder with Bowgage Hydraulic - Controls Serial No. 2785 -Pratt & Whitney 12" Slotter

Serial No. 71

All of the above are operating at present and can be inspected at any time.

BRAUN GEAR COMPANY 239 Richmond St., Brooklyn 8, N. Y.

WANTED TO BUY

One No. 4 AUTOMATIC SPRING COILING MACHINE—clutch type for continuous coiling.

O'BRIEN MANUFACTURING CO. 5662 Northwest Highway Chicago 30, Illinois

MACHINERY'S CLASSIFIED ADVERTISING



Advertising rates in the Classified and Re-sale Section gre \$10.00 per single-column inch. Send payment with your

NEW FIDELITY D. C. MOTOR CONVERTERS

102-1/6 HP 240 Volt D.C. 55-1/4 HP 200/220 Volt D.C.

111-1/4 HP 230/250 Volt D.C.

All output 110 volt-30 cycle 1800 RPM. For flange mounting. Continuous A.C. load of one transformer 10,000 volt 30 cycle 2.2 Ampere. Counter clockwise rotation viewing shaft end. We will accept any reasonable offer.

GILBERT & BARKER MANUFACTURING COMPANY

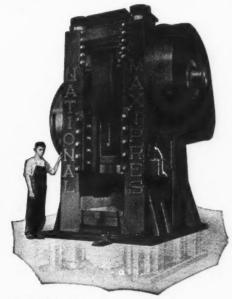
West Springfield

Massachusetts

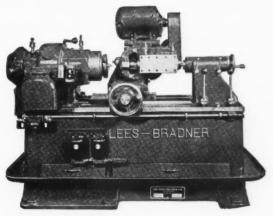
MUREY) DEPENDABLE ... for machine tools!

. . . PRICED RIGHT

MULTI-MILLION DOLLAR STOCK FOR YOUR SELECTION



NATIONAL No. 5 MAXIPRES 14" Stroke

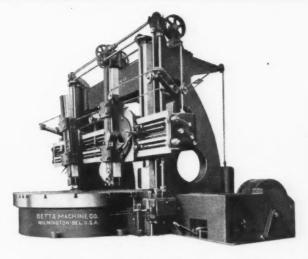


LEES-BRADNER 12" x 36" Thread Miller

YOUR INQUIRIES SOLICITED

Stock changes daily. We probably have just the machine you want.

WIRE-PHONE OR WRITE



BETTS 120" Vertical Boring Mill

AUTOMATIC Screw Machines BORING MILLS, Horizontal BORING MILLS, Vertical **BRAKES and SHEARS** BROACHES DRILLS, Radial
DRILLS, Miscellaneous
GEAR CUTTING EQUIPMENT **GEAR HOBBERS** GRINDERS, Plain, Cyl. and Univ. **GRINDERS**, Surface **GRINDERS**, Miscellaneous **HEADERS and UPSETTERS** LATHES, Engine and Mfg. LATHES, Turret MILLING MACHINES, Pl. and Univ. MILLING MACHINES, Mfg. MILLING MACHINES, Thread **PLANERS** SAWS SHAPERS-SLOTTERS PRESSES Most built after 1941—IMMEDIATE SHIPMENT

Many NEW Machines WITHOUT PRIORITY

. ASK FOR LATEST ILLUSTRATED CATALOG OF AMERICA'S FINEST STOCK OF MACHINE TOOLS

MOREY MACHINERY CO., INC.
408 BROOME ST., NEW YORK 13, N. Y.
TELEPHONE: CANAL A.7400 CABLE ADDRESS: WOODWORK, N. Y.



Invest in better methods for guaranteed returns

Automatic Bar and Chucking Machines • Precision Boring Machines
Lucas Horizontal Boring, Drilling and Milling Machines
New Britain +GF+ Copying Lathes



Automatics

THE NEW BRITAIN GRIDLEY MACHINE DIVISION
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT

ALPHABETICAL INDEX OF ADVERTISERS

A	Cincinnati Milling Machine Co.,	Giddings & Lewis Machine	Marac Machinery Corp 367
Abrasive Machine Tool Co 382	Grinding Wheels Div 120-121	Tool Co 18-19 Gisholt Machine Co.	Marlin-Rockwell Corp 40 Maryland Precision Instrument
Aetna Ball & Roller Bearing	Cincinnati Milling Products Div., Cincinnati Milling Ma-	Insert bet. 44-49	Co
Co	chine Co	Gits Bros. Mfg. Co 390	Massachusetts Gear & Tool Co. 308
Air Reduction Sales Co 375 Allegheny-Ludlum Steel Corp. 106	Cincinnati Shaper Co 231	Gleason Works 269	Materials Section 91-106
Allied Products Corp 345	Cities Service Oil Co 264	Gorham Tool Co	Mattison Machine Works, Insert bet, 76-91
Aluminum Co. of America94-105	Classified Advertisements 391-392-393	Goss & DeLeeuw Machine Co. 274 Grant Mfg. & Machine Co 378	Mead Specialties Co
American Air Filter Co., Inc 338	Clearing Machine Corp., Back Cover	Gray, G. A., Co 119	Metal Carbides Corp 102
American Brass Co., Insert bet. 126-129	Cleveland Crane & Engrg. Co. 66	Greaves Machine Tool Co 381	Meyers, W. F., Co., Inc 342
American Broach & Mch. Co.,	Cleveland Tapping Machine	Greenfield Tap & Die Corp.,	Michigan Tool Company 235 Micromatic Hone Corp 253
Insert bet. 76-91	Co. 294 Cleveland Twist Drill Co. 307	Greenlee Bros. & Co.,	Miles Machinery Co
American Chain & Cable51-278	Cleveland Worm & Gear Co.	Insert bet. 71-91	Millholland, W. K., Machinery
American Tool Works Co 71 Ames, B. C., Co	Inside Back Cover	Greer Hydraulics, Inc 73	Co., Inc
Apex Tool & Cutter Co., Inc 386	Columbia Machinery & Engi-	Grob Brothers	Minster Machine Co
Armstrong-Blum Mfg. Co 62	neering Corp	Gulf Oil Corporation 123	Moline Tool Co
Armstrong Bros. Tool Co 36 Arter Grinding Machine Co 336	Climax Molybdenum Co 344	H	Monarch Machine Tool Co 43
Atlantic Gear Works, Inc 386	Comtor Company 386		Morey Machinery Co., Inc.,
Austin Industrial Corp 376	Cone Automatic Machine Co.,	H. E. B. Machine Tools, Inc 347 Hamilton Tool Co 280	383-393 Morgan Engineering Co 384
Automatic Steel Products Inc 294	Inc	Hanchett Magna-Lock Corp 286	Morse Twist Drill & Machine
Automotive Gear Works, Insert 117 Axelson Manufacturing Co 281	Corp 135	Hanchett Mfg. Co 380	Со 16-17
vixeison Manufacturing Co 201	Cosa Corporation 116	Hannifin Corporation 33-111	Motch & Merryweather Mchry.
	Cross Company	Hardinge Brothers, Inc 142 Haynes Stellite Co., Div. Union	Co
	Cumberland Steel Co 92	Carbide & Carbon Corp 101	Murad Developments, Ltd 331
В	Cuno Engineering Corp 321	Heald Machine Co.	
Baker Bros, Inc 361		Inside Front Cover	
Baldwin-Lima-Hamilton Corp.,	D	Hendey Machine Co 309 Henry & Wright Div., Emhart	N
 Lima-Hamilton Div 126 Barber-Colman Co.,	Dake Engine Co 355	Mfg. Co 44	National Acme Co 69
Insert bet. 76-91	Danly Machine Specialties,	Hoglund Engineering & Manu-	National Automatic Tool Co.,
Bardons & Oliver, Inc	Inc	facturing Co., Inc	National Broach & Machine Co. 293
Barnes Drill CoInsert bet. 76-91 Barnes, John S., Corp.,	Davis Keyseater Co 380	Inc	National Machinery Co 373
Insert bet. 76-91	Dayton Rogers Manufacturing	Hy-Pro Tool Co 348	National Tool Co 49
Barnes, W. F. & John, Co.,	Co	Hyatt Bearings Div., General Motors Corp	National Twist Drill & Tool Co
Insert bet. 76-91		motors corp	New Britain-Gridley Div.,
Bath John Co Inc 270	Motors Corp 39		New Diffiant-Gridley Div.,
Bath, John, Co., Inc	Denison Engineering Co 371	I	The New Britain Machine
Bennett Metal Treating Co 388 Bethlehem Steel Co 93-99	Denison Engineering Co		The New Britain Machine Co 260-261-394
Bennett Metal Treating Co 388 Bethlehem Steel Co 93-99 Birdsboro Steel Foundry &	Denison Engineering Co 371	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91	The New Britain Machine
Bennett Metal Treating Co 388 Bethlehem Steel Co 93-99	Denison Engineering Co. 371 Detroit Die Set Corp. 326 Diefendorf Gear Corp. 384 Diversified Metal Products Co. 358 DoAll Company 333	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers'	The New Britain Machine Co
Bennett Metal Treating Co. 388 Bethlehem Steel Co. 93-99 Birdsboro Steel Foundry & Mch. Co. 379 Black & Decker Manufacturing Co. 265	Denison Engineering Co. 371 Detroit Die Set Corp. 326 Diefendorf Gear Corp. 384 Diversified Metal Products Co. 358 DoAll Company 333 Dreis & Krump Mfg. Co. 378	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91	The New Britain Machine Co
Bennett Metal Treating Co. 388 Bethlehem Steel Co. 93-99 Birdsboro Steel Foundry & Mch. Co. 379 Black & Decker Manufacturing Co. 265 Blanchard Machine Co. 50	Denison Engineering Co. 371 Detroit Die Set Corp. 326 Diefendorf Gear Corp. 384 Diversified Metal Products Co. 358 DoAll Company 333	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co. 388 Bethlehem Steel Co. 93-99 Birdsboro Steel Foundry & Mch. Co. 379 Black & Decker Manufacturing Co. 265	Denison Engineering Co. 371 Detroit Die Set Corp. 326 Diefendorf Gear Corp. 384 Diversified Metal Products Co. 358 DoAll Company 333 Dreis & Krump Mfg. Co. 378 Drillunit, Inc. 275	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co. 371 Detroit Die Set Corp. 326 Diefendorf Gear Corp. 384 Diversified Metal Products Co. 358 DoAll Company 333 Dreis & Krump Mfg. Co. 378 Drillunit, Inc. 275	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co. 260-261-394 New Jersey Gear & Mfg. Co 384 Niagara Machine & Tool Wks. 130-131 Nichols-Morris Corp. 385 Nicholson File Co. 129 Nilson, A. H., Machine Co 304 Norma-Hoffmann Bearings Corp. 64
Bennett Metal Treating Co. 388 Bethlehem Steel Co. 93-99 Birdsboro Steel Foundry & Mch. Co. 379 Black & Decker Manufacturing Co. 265 Blanchard Machine Co. 50 Bodine Corporation 285 Botwinik Brothers of Mass., Inc. 392 Brad Foote Gear Works, Inc. 56	Denison Engineering Co. 371 Detroit Die Set Corp. 326 Diefendorf Gear Corp. 384 Diversified Metal Products Co. 358 DoAll Company 333 Dreis & Krump Mfg. Co. 378 Drillunit, Inc. 275 E Earle Gear & Machine Co. 383	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co. 371 Detroit Die Set Corp. 326 Diefendorf Gear Corp. 384 Diversified Metal Products Co. 358 DoAll Company 333 Dreis & Krump Mfg. Co. 378 Drillunit, Inc. 275	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co. 260-261-394 New Jersey Gear & Mfg. Co 384 Niagara Machine & Tool Wks. 130-131 Nichols-Morris Corp. 385 Nicholson File Co. 129 Nilson, A. H., Machine Co 304 Norma-Hoffmann Bearings Corp. 64
Bennett Metal Treating Co. 388 Bethlehem Steel Co. 93-99 Birdsboro Steel Foundry & Mch. Co. 379 Black & Decker Manufacturing Co. 265 Blanchard Machine Co. 50 Bodine Corporation 285 Botwinik Brothers of Mass., Inc. 392 Brad Foote Gear Works, Inc. 56	Denison Engineering Co. 371 Detroit Die Set Corp. 326 Diefendorf Gear Corp. 384 Diversified Metal Products Co. 358 DoAll Company 333 Dreis & Krump Mfg. Co. 378 Drillunit, Inc. 275 E Earle Gear & Machine Co. 383 Eastern Machine Screw Corp. 389 Eastern Machinery Co. 391 Eastman Kodak Co. 335	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen Industries Insert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen Industries Insert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen Industries Insert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co. 260-261-394 New Jersey Gear & Mfg. Co 384 Niagara Machine & Tool Wks. 130-131 Nichols-Morris Corp. 385 Nicholson File Co. 129 Nilson, A. H., Machine Co 304 Norma-Hoffmann Bearings Corp. 64 Northwestern Tool & Engineering Co. 389 Norton Company 14-15-114-115 O Oakite Products, Inc. 91 Ohio Crankshaft Co. 60 Ohio Gear Company 365 Oliver Instrument Co. 354 O'Neil-Irwin Mfg. Co. 370 Orange Roller Bearing Co., Inc. 325
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen Industries Insert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen Industries Insert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98	The New Britain Machine Co
Bennett Metal Treating Co	Denison Engineering Co	International Nickel Co., Inc. 98 Ipsen IndustriesInsert bet. 76-91 Italian Machine Tool Makers' Association	The New Britain Machine Co

ALPHABETICAL INDEX OF ADVERTISERS—Continued

R	Shell Oil Co 305	U	Willey's Carbide Tool Co 388
R and L Tools 377	Shepard Niles Crane & Hoist	U. S. Tool Company, Inc 12-13	Williamson Gear & Mch. Co. 384
Reed-Prentice Corp 38	Corp 306	Union Carbide & Carbon Corp.,	Wilson, K. R 357
Rehnberg-Jacobson Mfg. Co.,	Shore Instrument & Mfg. Co., Inc	Haynes Stellite Co. Div 101	Wilson Mechanical Instrument
Insert bet. 76-91	Sinclair Refiring Co 276-277	Union Drawn Steel Div., Re-	Div., American Chain & Cable 27
Republic Steel Corp 100-104	Skilsaw, Inc	public Steel Corp 100	Winter Brothers Co 20
Revere Copper & Brass Inc 236	South Bend Lathe Works 344	Universal Engineering Co 124	Y
Rockford Clutch Div. of Borg-	Stahl Gear & Machine Co 384	Used Machinery 391-392-393	
Warner 271	Standard Gage Co., Inc 76		Yoder Company
Rockford Machine Tool Co., Insert bet. 76-91	Standard Locknut and Lock-	V	Z .*
Rollway Bearing Co., Inc 42	washer, Inc 353	Van Keuren Co 291	
Rowbottom Machine Co. 381	Standard Oil Co. (Indiana) 272-273	Van Norman Co 8-9	Zeh & Hahnemann Co 378
Russell, Burdsall & Ward Bolt	Standard Pressed Steel Co30-31	Verson Allsteel Press Co.	
& Nut Co 70	Standard Tool Co 279	Front Cover	
Russell, Holbrook & Hender-	Starrett, L. S., Co., The 246	Viking Pump Co	
son, Inc 311	Stuart, D. A., Oil Co., Ltd 63		IN CLASSIFIED SECTION
Ruthman Machinery Co 390	Sun Oil Co 243		American Can Co 391
Ryerson, Joseph T., & Son,	Sundstrand Machine Tool Co.,	W	Braun Gear Co
Inc 144	Insert bet. 76-91	Waldes Kohinoor, Inc 287	Botwinik Brothers of Mass.,
	44	Wales-Strippit Corp 122	Inc
		Walker, O. S., Co., Inc 328	Chicago Electric Co 391
S	T	Walker-Turner Div. Kearney	Eastern Machinery Co 391
Sales Service Machine Tool	•	& Trecker Corp 372	Fairchild Engine & Airplane
Co 340	Taft-Peirce Mfg. Co 28	Walls Sales Corp 380	Corp
Scherr, George, Co., Inc387-389	Texas Company 140	Waltham Machine Works 383	Falk Machinery Co
Second European Machine Tool	Thompson Grinder Co 283	Warner & Swasey Co 26-27	Gilbert & Barker Mfg. Co.
Exhibition, Hanover 369	Thriftmaster Products Corp 389	Warner Electric Brake &	Hyman, Joseph, & Sons
Seneca Falls Machine Co 317	Timken Roller Bearing Co.	Clutch Co 74-75	Lincoln Machinery Sales Corp. 391
Severance Tool Industries, Inc. 388	(Steel and Tube Div.) 97	Wesson Company 332	Miles Machinery Company 393
Sheffield Corp 245	Torrington Co	Wheelock, Lovejoy & Co., Inc. 310	Morey Machinery Co., Inc.
Sheldon Machine Co., Inc 296	Twin Disc Clutch Co 330	Wiedemann Machine Co 341	O'Brien Manufacturing Co.



AUGUST 1952 - FIFTY-EIGHTH YEAR

CHINERY

8 aug 1952

THE PART DESC BRANT

338 384

> THESE TWO MACHINES (drawn to scale) do the same job ...

CONVENTIONAL RUBBER PAD HYDRAULIC PRESS

Rated tonnage 5,000 2,300 psi pad pressure 27 feet in height 275 tons in weight Occupies 4,500 cu. ft. Requires 250 H.P.

> THE NEW VERSON-WHEELON DIRECT ACTING HYDRAULIC PRESS Rated tonnage 10,000 5,000 psi pad pressure 5'4" in height 50 tons in weight Occupies 675 cu. ft. Requires 100 H.P.



VERSON ALLSTEEL PRESS CO.

9309 S. Kenwood Ave., Chicago 19, Illinois • So. Lamar at Ledbetter Dr., Dallas, Texas



A research technician studies the vibration characteristics of a Heald grinding spindle mounted in a Red Head Hi-Frequency wheelhead.

Making good equipment still better is a never-ending job in Heald's far-sighted research department Heald research engineers are never satisfied. To them, the best is never quite good enough. That's one important reason why Heald machines have consistently set the pace for faster, easier and better production of precision finished parts.

Yesterday's research is now helping manufacturers everywhere to perform daily miracles of speed and precision in the critical switch from peace-time to defense production. And today's research holds the key to tomorrow's production problems—whatever the picture may be.

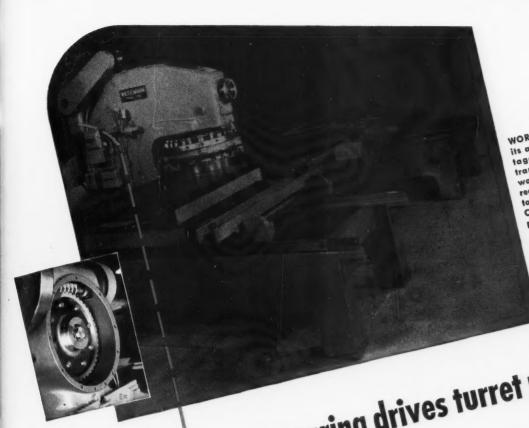
The Heald research laboratory is completely equipped with the finest of precision instruments—for measuring size, hardness, surface finish, temperature, vibration, pressure and viscosity. Still more important, however, is the specialized experience of the men who use them. For it is their skill that translates test results into practical design improvements. Remember—when it comes to precision finishing, it pays to come to Heald.



Heald machines speed the nation's production THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



WORM GEARING-universal in WORM GEAKING—universal in its application—affords advanits application—arroras auvant tages for almost every power transmission job. Whether you transmission job. Whether you want worm gearing sets or speed want worm gearing sets or speed reducer units, you will find drives to make the complete to make your pead in the complete to make your pead in the complete. reducer units, you will find drives to meet your need in the complete Cleveland line. Write for new 180-Creveland line. Write for new 180-page Catalog 400, just off press.

Photograph at left of turret punchin press, with inset shawing builting Cleveland worm-gearing, by courtesy of Wiedemann Machine Co.

CLEVELAND worm gearing drives turret punch press

I any machine tool must operate, there is an ideal

them,

npor-

et the

cision

urers pre-

fense mory be. pped

uring tion, er, is . For

tical pre-

Y

w York

Worm gearing as built by Cleveland is rugged, effidrive-Cleveland Worm Gearing.

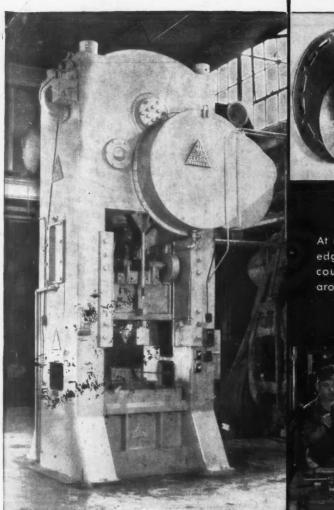
cient and dependable. It transmits power with a smooth, quiet, steady torque flow. It is compact and space saving. And speed reduction to any desired ratio is possible.

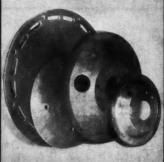
For 40 years Cleveland has devoted its facilities exclusively to engineering and manufacturing highest quality worms and gears. No wonder that so many Clevelands

installed in the teens and twenties are still in service. If you are building or using equipment that calls for worm gearing, of either standard or special sizes and

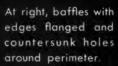
types, just drop us a line. The Cleveland Worm and Gear Company, 3276 East 80th St., Cleveland 4, Ohio. Affiliate: The Farval Corporation, Centralized Systems of Muate: 1 ne rarvat Corporation, Centratized Systems 6 Lubrication. In Canada: Peacock Brothers Limited.

EVELAND Speed Reducers Worm Gear





At left are wheel fairings drawn from age hardening aluminum.







At left, steel part drawn 7" deep with heavy embossment in crown.

VARIETY SHOW

From 13 gauge to one-half inch plate... From hot rolled steel to age hardening aluminum... Whatever the task assigned to it, this Clearing 400 ton crankless press has been giving dependable service for more than ten years at Leake Stamping Company of Monroe, Michigan. Clearing presses are built to give dependable performance with low maintenance costs whatever the production requirements may be.

It's always a good idea to look to Clearing for help whenever your production problems involve the forming of metal.

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET * CHICAGO 38, ILLINOIS

GLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

